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APPROACHES TO WATERSHED ECONOMICS THROUGH EXAMPLE

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Approaches to Watershed Economics Through Example

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EXECUTIVE SUMMARY

Stewardship of soil and water resources is recognized by many and is addressed by legislation. However, many people view watershed management as a cost with no economic benefits. Recent research and analyses have demonstrated that the way soil and water are managed can make significant differences in growth and yields of timber, in forage production, in fish biomass, in enhanced water related values and resources downstream, and in road construction and maintenance costs.

A National effort has developed analysis procedures for estimating the economic benefits of soil and water resource management. The National effort focused on 5 emphasis areas: timber, forage, fish, enhanced water,and road construction and maintenance. The benefits are increments of increased timber, forage, and other resources from improved soil and water resource management. The procedures can be applied to recreation, wildlife and other soil and water dependent resources. The report discusses these procedures, and the data and information requirements to employ the procedures.

The procedures and economics of soil and water management are demonstrated by 16 examples. Examples were developed for all emphasis areas and for all regions of the country.

The interrelationships between soil and water and other related land resources are embedded in watershed management. Watershed management practices or projects illustrated by report examples, include:

1) rehabilitation practices aimed at correcting past land use actions;

2) protection practices to maintain, sustain, augment, or enhance current or future land uses; and

3) integration of watershed practices aimed at sustaining or enhancing upland productivity (while preventing adverse on-site or downstream impacts) into other resource development actions.

This report provides a workable framework discussing a set of economically feasible watershed practices/projects which have been applied on National Forest lands. Most of the examples presented demonstrate positive returns from investments in soil and water resource management.

A few examples evaluated practices that were not cost effective for a specific site and management situation. However, these practices applied in another setting may prove to be cost effective.

These examples can assist others in quantifying and evaluating the economics of water and related land resource practices and projects. Such analyses will aid in prioritizing projects or practices for funding to gain the greatest economic efficiency.

In the examples, incremental outputs and values of induced goods and services attributable to investments in the management of soil and water resources on forest and range lands are identified. The examples provide insights into the

economic implications and impacts of watershed management and other related land resource activities, practices, and projects.

Forest resources are being managed in an integrated manner. The procedures allow analysis of multiresource responses and economics of soil and water management activities.

The report contains procedures and information that will be useful to a wide variety of agencies, industry, private landowners, universities, forest managers, and consultants. It contains data and procedures that will assist in agency program and budgeting processes.

Research needs are identified to advance the development of the economics of soil and water resource management.

The bibliography contains over 700 references, which have been classified as what types of data or information they contain and where such information fits in the analysis procedures presented in the report. The bibliography will provide a good starting reference for analyses in various regions of the country.

PREFACE

Stewardship of soil and water resources is recognized by many, and is addressed by legislation. However, many people view watershed management as a cost, with little or no direct economic benefit. Recent research and analyses have demonstrated that the way soil and water are managed can make significant differences in growth and yields of timber, in recreation use, in fish biomass, in forage production, in water treatment costs, and in road construction and maintenance costs.

Several factors brought about recognition of the serious need to develop information about the costs and benefits of soil and water resource management.

In April, 1986, at a Watershed Directors' meeting, the Director of Watershed and Air Management Staff (Washington Office) and the Regional Watershed Directors considered several related issues:

> first, in recent years the economics of natural resource management has become a major national issue;
>
> second, forest land management planning includes economic evaluations of resource management alternatives;
>
> third, the National Debt issue has raised questions of benefit/cost concerning investments in natural resource management, especially concerned with "below cost" timber sales and returns to the Treasury; and
>
> finally, private and industrial landowners need demonstrated economic returns over the costs of investing in soil and water management.

To help address these and other issues, the economics of soil and water resource management need to be quantified. A variety of Federal, state and local agencies, forest industry, universities, and interest groups have also expressed a need for procedures, information, and demonstration examples for economics of soil and water resource management.

As a result, a national effort was initiated to quantify the economic benefits of soil and water resource management.

An interdisciplinary team was established to develop the economics of soil and water resource management. The interdisciplinary team included an economist, a forester, two hydrologists, a range economist/conservationist, and a soil scientist representing the Washington, Regional, and Forest levels of the Organization. The National Forest System and State and Private Forestry were represented on the team.

The team was charged with demonstrating the economics of soil and water resource management through examples. Team members searched for available reports from National Forests, state foresters, and industry; conducted literature searches; and constructed examples from available data, information and models.

The product is this report, containing procedures for making economic analyses; presenting examples of economic analyses demonstrating the methodologies; identifying sources of information; and recommending follow-up actions.

The report provides information and procedures useful to a wide variety of potential users. The Washington Office, Regional Offices, and individual National Forests can use the report in watershed program planning, prioritizing tasks, implementing forest plans, documenting the induced resource outputs from soil and water management, and determining the economic benefits of soil and water management. State and Private Forestry units and state foresters can use it in program planning and administration, and in transferring soil and water conservation technology to forest industry and to the small private landowners.

The report also identifies research needs. If Forest Service Research, universities, and other agencies conduct studies in these areas, soil and water resource management will be strongly advanced.

OVERVIEW OF TEAM EFFORT

Charter Statement and Guiding Principles

Soil and water are the basic resources. They are essential to the production of all forest and range land products and services.

The amount of goods and services that will be produced on these lands directly depends on the manner in which the soil and water resources are managed, conserved, and used.

These resources and services have economic value, which vary to the extent that they are in limited supply and meet human needs. Through specific examples, this "Economic Values of Soil and Water Resource Management" project identified incremental outputs and values of induced goods and services that can be attributed to investments in soil and water resource management on forest and range lands.

The team limited the effort to five emphasis areas: timber, forage, fisheries, enhanced water, and roads. The procedures developed to evaluate the economics of watershed management in these five emphasis areas are also applicable to other resource analyses.

Generally, the project emphasized comparing the value of goods and services produced (or conserved) with costs incurred. Therefore, examples of induced outputs or benefits (goods and services) at local and regional levels resulting from investments in soil and water resource management in timber, forage, enhanced water and fisheries, and cost savings associated with roads were examined.

An induced benefit is a primary benefit incidental to the objectives of the policy, program or project. The term induced outputs, as used in this report, refers to the increment of increased (or decreased) direct or indirect output of goods and services attributed to soil and water resource management.

For the purposes of this project, the concept governing induced costs and benefits (in accordance with Forest Service policy) is that the resource activity or program that incurs the costs accounts for the benefits derived.

Thus, if investments in soil and water management induce resource outputs, benefits are attributed to soil and water management activities. Similarly, if timber management investments induce other resource outputs, that program is credited with producing the benefits. If several resource programs make interrelated investments in a project, all share credit for benefits derived.

Agency soil and water programs fund projects such as watershed improvements, watershed rehabilitation, skid trail and road rehabilitation, and quantifying and securing (through special use permits and water rights) instream flows. All induced outputs of timber production, forage, fisheries, enhanced water, and savings in road costs induced by these investments are claimed by the agency's soil and water programs.

Often agency soil and water programs include technical assistance and advice to timber, range, fisheries and other resource management. Technical assistance

includes making soil and water prescriptions, reviewing timber management prescriptions, providing soil interpretations, and a variety of similar inputs. Thus, soil and water makes investments in multiple-use management. Soil and water technical assistance can be credited with a portion of the timber, forage, and other resource outputs induced by implementing the recommended soil and water resource management.

Induced outputs are quantified by comparing resource outputs between sites where soil and water management was implemented with sites where it was partially or not implemented.

Cost information for soil and water resource management came from 1) investments in soil and water projects and 2) costs associated with technical assistance to other resource management projects.

To be usable for this project, examples had to meet two criteria: 1) investments in soil and water resource management were made in the project; and 2) identifiable induced outputs resulted from implementing soil and water resource management.

Literature Search

Information and assistance were requested from Regional Foresters, the Director of the Northeastern Area, and others in a letter from the Chief of the Forest Service. Next, contact persons were established at each of the Regional and Area Offices, and team members met with each one to discuss the project and to define the type of data, information, and reports needed.

A slide program was used to demonstrate the types of resource and economic analyses to be developed by the team. Regional contacts then worked with National Forest Supervisor's Offices, state foresters, research units, and universities to locate data, papers, reports, or examples of economic analyses that showed potential for use in this project.

A questionnaire was developed to assist in requesting literature and reports from the various sources.

The Rocky Mountain Forest and Range Experiment Station in Fort Collins, Colorado established a position to conduct literature searches, assemble reports from the Regions, catalogue materials found and received, support the team with information needs, and develop the bibliography.

The literature search was limited to five emphasis areas: timber, forage, fisheries, enhanced water, and roads. To assist in the literature search, a matrix was developed for each area.

These matrices are briefly described the **Matrices** subsection of this section, and in complete detail in **APPENDIX A**. The matrices have rows and columns (see Table 1). The columns identify types of data or procedures needed for an economic analysis. The rows are soil and water related practices for which data or procedures were to be found and used in the analysis. The intersection of a row with a column is a cell in the matrix.

The literature searches were structured to locate information, data, or procedures pertinent to each cell in the matrix. Computer literature searches were not very fruitful, because available key words were too general and did not reflect the specific needs associated with each cell. Most of the useful literature was located by reading Forestry Abstracts to determine if the paper contained useful information.

The Regional contacts, team, and National Forest personnel located many papers and reports, although the majority of the papers were located through the literature search. Through this combined effort, over 700 publications were located and catalogued. There is no easy way to locate this type of information. It requires rigorous review of reports, digging into the abstracts, and spending large blocks of time in the library.

Matrices

Five matrices were developed to estimate the economic benefits from soil and water resource management for the emphasis areas. These matrices served three functions. They: 1) directed the literature searches; 2) governed the cataloguing of papers; and 3) served as a framework for projecting the induced outputs and economic benefits from soil and water resource management.

To illustrate the matrices, a simplified timber matrix (Table 1) is discussed here. Two Southern soil and water related timber management practices are compared: site preparation for tree planting, using disking, and chop and burn practices (column 1). Further explanations of the information in each column follow the table.

Table 1. Simplified timber matrix.

(1) Soil & water related practice	(2) Stock'g level (%)	(3) S&S growth (Ft.)	(4) P&S growth (Ft.)	(5) Ht. growth curves	(6) G&Y yield tables	(7) Induced res. output	(8) Economics B $	C $	B/C	IRR %
Site prep.										
Disking	%	Ht.	Ht.	R	Ya					
Chop & burn	%	Ht.	Ht.	R	Yb	Yb-Ya	$	$	B/C	%

Note that disking usually follows shearing and windrowing, which removes nutrients and topsoil to windrows and often reduces soil productivity. Chopping followed by a cool burn leaves more nutrients in place, and better maintains soil productivity. To evaluate timber resource output differences between treatments, the following information and analysis tools are needed.

The type of site preparation practice can affect initial stocking levels (column 2). To determine if both treatments produce adequate stocking levels throughout the rotation, the future stocking levels can be estimated using stocking versus age curves.

Seedling and sapling height growth can be different between these two site preparation practices (column 3). Seedling and sapling height growth data is

available in the literature for these practices for specific timber types and sites.

Sometimes the literature contains data on pole and sawtimber height growth differences between site preparation treatments (column 4). Using height growth curves (R in column 5), rotation height can be estimated from early stand height.

Estimated stocking levels and rotation stand height can be entered into growth and yield tables (column 6) to estimate wood volumes at the end to the rotation. The estimated wood volume for disking is yield A (Ya), while chop and burn should yield B (Yb). Assuming disking produces less wood volume than chop and burn, the induced timber output from better soil productivity maintenance is yield B minus yield A (Yb-Ya in column 7).

The increment of induced timber volume (Yb-Ya) has a stumpage value that is discounted to a net present value or a benefit (B) in column 8. The cost of site preparation and management over the rotation is adjusted to a present cost (C) in column 8.

A benefit/cost ratio (B/C) is computed, as well as an internal rate of return (IRR) (column 8).

This type of analysis quantifies the interactions between resource outputs and soil and water management. It reveals the worth of soil and water resource management in terms of timber and other resource outputs. It can demonstrate which soil and water related practice should produce the most goods and services from forest land.

Standard Analysis Procedures

The team reviewed the accumulated literature and reports, and developed standard analytical procedures. Information from the literature search led them to revise matrices as needed. Next, based on available literature, examples were selected for development.

The examples followed the processes outlined by the matrices and used established resource analysis procedures. If a Forest Service Regional Office had models to evaluate resource responses, these models were utilized.

For example, if a soil and water related practice influenced site index, then a Regional timber growth and yield model was used to estimate growth and yield differences between practices. The team developed several examples to demonstrate how the matrices are used, the types of data and procedures needed, and the kind of results the analysis procedures produce.

APPLICATION OF ECONOMIC MATRICES TO OTHER RESOURCES

Soil and water resource management induces outputs in recreation, wildlife, and other resources. The matrices and analysis procedures developed for the five emphasis areas demonstrate methods of economic analyses that can be applied when evaluating the interactions of soil and water management actions with other resource management activities.

The procedures presented in this report may not fit the needs of every situation. This should not prevent evaluating the induced outputs and cost savings for a new situation, as the procedures and concepts can be adapted.

The value of the matrices and examples is the demonstration of the concepts, data sources needed, and approaches to determining the economics of soil and water resource management.

ECONOMIC ANALYSIS

All but one of the examples in this report are subjected to three standard investment analysis criteria: Internal Rate of Return, Present Net Value, and Benefit/Cost Ratio.

The costs and benefits of each example are presented in terms of early to mid-1980 dollars, thus each analysis is in real terms. Future costs and benefits are impacted by general price inflation to the same degree, hence inflation is a constant and cancels itself out.

The examples reflect only the increases in purchasing power of the investments. Accordingly, conscious effort was made to select a reasonable discount rate expressed in real terms.

A 4 percent rate was chosen for two basic reasons:

1) it is the rate the Forest Service uses when evaluating for internal purposes; and

2) it is a reasonably good rate to apply in cases typical of industrial and nonindustrial private landowners.

It should be understood, however, that there is nothing sacred about a 4 percent discount rate. A rate was needed to show the quantitative examples.

Even though 4 percent is widely used and defensible, other rates could have been used, as long as they were in real terms (that is, do not contain any inflation), and reasonably reflected the likely real rate increases that will be in effect in the economy (during the time span inherent in the problem being analyzed).

Selected evaluation terms and their definitions (based upon Forest Service Handbook 1909.17):

Internal Rate of Return (or rate of return in FSH 1909.17) is the discount rate that makes the present benefit value equal the present cost value. It is the capital growth rate while invested in the project.

Discount Rate, Real. A discount rate adjusted to exclude the effects of inflation.

Discount Value: A method used in project evaluation to discount future costs and benefits to the present.

Present Net Value is the present benefit value of the stream of benefits less the present cost value of the schedule of costs.

Benefit/Cost Ratio is the present benefit value divided by the present cost value.

Methodology. Methodology for economic and social analysis used in this report is based on standard economic principles employed in economic efficiency analysis. Concepts and principles have been extrapolated from standard economic texts in to Forest Service manuals and handbooks. These are: Forest Service Manual (FSM) 1970, Economic and Social Analysis; Forest Service Handbook (FSH) 1909.17, Economic and Social Analysis Handbook; FSH 2209.11, Range Project Effectiveness Analysis Handbook, and FSH 2509.15, Watershed Improvement Handbook.

The "Watershed Economic Examples" presented in the report are applications of the concepts and principles contained within these Forest Service directives. The examples rely on economic analysis methods involved in benefit/cost analysis, present net value, and internal rate of return.

Except for one or two exceptions, nonmarket benefits are not quantified or valued. While it was not the intent of the authors to cover nonmarket outputs such as wildlife, fish, scenery, and so on, these values may be included in the cost effectiveness analysis of watershed projects or soil and water resource management. For more specific reference to the economic methods employed in the examples the reader may refer to the Forest Service directives cited, or standard economic texts on cost benefit (economic efficiency) evaluation.

INTEGRATED RESOURCE MANAGEMENT

The concepts, information, economic analysis procedures, and bibliography contained in this report are applicable to all phases of integrated land and resource management. The type and degree of integrated resource management will vary between agencies and landowners.

As projects are analyzed and designed, all resource benefits and costs need to be considered. To adequately address these concerns, the skills of resource specialists and economists are needed.

Resource specialists determine the costs and resource responses of soil and water management, and work with economists to determine resource outputs, direct and induced economic benefits, and costs. Economic benefits are valued through present net value, internal rates of return and benefit/cost analysis.

An example of integrated resource planning and economic analysis is the process used by the Forest Service in developing and implementing National Forest plans. The specific details regarding this process are found in Forest Service Handbook 1909.12, Land and Resource Management Planning Handbook.

The examples presented in this report deal with tangible soil and water benefits. The team recognizes that intangible benefits are important and should be included in comprehensive analyses of the economics of soil and water resource management. The following examples were developed from data and reports supplied to the team. Most did not address intangible benefits--in fact only one of the examples supplied directly addresses them.

The team recognizes that soil and water management affects a variety of resource outputs. Again, most of the data and reports supplied evaluated only a single resource response to a soil and water treatment. A few analyses did evaluate several resource outputs from soil and water management.

Most examples outline the process used to estimate a single induced output between soil and water practices.

The process for evaluating a single resource response can be linked with several other processes to evaluate multiple resource responses for a set of soil and water practices. The five matrices presented in this report outline a variety of processes for evaluating induced outputs from soil and water management. The matrices and processes can be linked to perform a comprehensive analysis of resource interactions.

EXAMPLES OF SOIL AND WATER RESOURCE MANAGEMENT AND ECONOMIC EFFICIENCY ANALYSIS

The following 16 examples demonstrate the application of the concepts, matrices, and analytical procedures discussed in previous sections. They are meant to stimulate thoughtful consideration of how the concepts and analytical procedures might be used to evaluate the economics of soil and water management situations.

The examples were solicited from various regions of the country, and specifically address the five emphasis areas. A majority of the examples emphasizes timber production, though other outputs such as forage, fish and wildlife, and reduced sedimentation are also identified and evaluated.

The examples are presented in summary or outline form, and are complete enough to show the analytical approach used. If outputs can be quantified and value, they should be included in the analysis. Note, however, in some of the examples, some market outputs that might be expected are not mentioned, and in only one or two examples are nonmarket outputs (such as aesthetics and wildlife) valued. It is not the purpose of this report to suggest that measurable market and nonmarket outputs be ignored or excluded from consideration.

Format of the Examples:

Title: Describes the example.
Source: Source of the example.
Problem: A statement of the problem and/or objective of the analysis. Identifies resource management opportunities or losses being incurred.
Soil and Water Involvement: Here, how soil and water resource management contributed to the resolution of the problem is briefly described.
Approaches to Solution: Possible solutions or approaches to solving the problem are discussed.
Economics: Tables or narratives, including information on data inputs, timing of resource outputs, dollar investments and benefits, cost schedules, present net values, benefit/cost ratios, and internal rates of return are presented.
Conclusions: Interpretations of economic analysis and resource management.
References: Literature citations.

For complete documentation of each example, specific references supporting each example are given. In some cases, examples are based on a specific situation. Outputs are presented for that specific situation, but the economic analysis was revised to conform with procedures established by the team.

Example 1: Title: Soil and Water Resource Management In Road Construction and Maintenance.

Source: Eastern Region, USDA Forest Service.

Problem:

Soil and water resource management needs to be included in road location, design, construction and maintenance.

This need applies to all classes of landownership. Roads constructed and maintained without soil and water resource management involvement may have unacceptable environmental impacts, cost more to maintain, possibly cost more to build, and (over time) may cost more to operate.

The main haul road to a timber sale was built across problem soils where the cutbanks yield excessive surface runoff and erode easily. Timber will be hauled over the road periodically for the next 20 years.

The volume of runoff from the cutbanks is sufficient to erode through the road surface and subgrade. To maintain access, repair of road surface and subgrade will be needed approximately every three years.

Soil and water resource management was not included in road location, design, and construction.

Soil and Water Involvement:

A soil scientist could have mapped the soils, reviewed the road location in the field, made soil interpretations, assisted in the design of runoff and erosion control practices, and/or provided necessary training to foresters and engineers in soil and water resource management associated with roading.

Solution:

The road should have been constructed with midslope terraces in cutbanks and water diversion above cutbank. Slopes would have been seeded, fertilized, and mulched.

Rationale:

The existing road is experiencing runoff and erosion damage to cutbank, road surface and road subgrade. Actual repair costs for maintenance (scheduled at three year intervals) are reported.

The continuing repair costs could have been eliminated if erosion and runoff control structures had been designed and constructed in and above the cutbanks. Projected construction costs are based upon actual construction data for similar projects on National Forest land.

Economics:

Current situation: haul road built without soil and water support. Repair costs are as follows:

A. Equipment costs:

1. 10-yard dumptruck, lowboy, and operator	$30/hr. x 6 hrs. =	$180
2. Frontend loader, operator	$35/hr. x 3 hrs. =	105
3. Bulldozer, operator	$40/hr. x 2 hrs. =	80
		$365

B. Materials

1. 30 yards pit run gravel for subgrade fill	at $.75/yard =	$22
2. 20 yards of Class 5 surface gravel	at $5.00/yard =	100
		$122

C. Repair work supervision	$10/hr.x 4 hrs. =	$40
		$40
	Total repair cost =	$527

These repair costs are projected to recur every three years, or six times over the 20-year expected life of the road. The discounted value of the costs of these six maintenances (to the time of original construction) is $2,137, using a discount rate of 4 percent.

Alternative: Soil and water input into haul road design and construction, and construction of erosion and runoff control structures.

Cost of support services and structures:

A. Labor to construct mid-slope terraces and water diversions above cutbank	$780
B. Material to revegetate cutbank, seed, fertilizer and mulch	120
C. Soil scientist support services	300
Total =	$1,200

The additional $1,200 cost at the time of construction would have eliminated the heavy maintenance every three years.

Considering the $2,137 saved as a benefit from spending $1,200 more at time of construction:

the internal rate of return from $1,200 additional cost is 11.2 percent;

the present net value is $937; and

the benefit/cost ratio is 1.78 to 1.00.

<u>Conclusion</u>:

The additional preventive construction cost at the time the road was originally built would have been strongly justified on economic grounds.

Example 2: Title: Benefits of soil and water input into the design for a road reconstruction project.

Source: Value Engineering Proposal Summary, 3 Forks Road Reconstruction, January 18, 1984, R-3, Apache/Sitgreaves NF, Dean Berkey, et al.

Problem:

A proposal for reconstruction of 3.0 miles of existing single lane road to double lane with an aggregate surface. The new design was for 35 mph travel speeds and future designation as a Forest Highway. Design standards and cost estimates were based on the 1979 reconstruction of an adjacent section of the same road. The project required both protection of soil and water and maintaining low costs.

Estimated cost for the reconstruction, based on the 1979 experience, is $796,000.

Soil and Water Involvement:

A hydrologist was appointed as a member of the interdisciplinary team for the project. Technical contributions included a provision for steeper road bank cuts in soils of low erodibility and low revegetation potential, and a narrower road width, which would reduce construction costs while disturbing less soil.

Approach:

The approach was simply to provide soil and water expertise on the interdisciplinary team for the project evaluation, and to incorporate into the design suggestions meeting watershed constraints and contributing to project objectives.

Rationale:

Because of the knowledge and expertise brought to the team by the hydrologist, adjustments in design were made. These resulted in significant savings, met project objectives, and protected soil and water values.

Economics:

	Without Soil/Water Input	With Soil/Water Input
Miles of Road	3.0	3.0
Reconstruction Costs	$796,000	$372,044
Soil/Water input costs	-	$800
Immediate benefit (savings) of Soil/Water input	-	$211,978

Long term benefits (road in place--no appreciable difference in annual costs).

Conclusions:

This example shows a dramatic savings as a result of soil and water expertise.

Watershed input, which cost about $800, resulted in 50 percent of the savings of $423,956. While this example demonstrates an immediate savings benefit, often the positive economic benefits of soil and water input for most road construction/reconstruction projects come over the long term.

Considering "best management practices" for soil and water protection in road design results in longer life and less maintenance costs for roads. We often become preoccupied with the costs associated with the incorporation of these practices, neglecting to consider their short and long term benefits. These benefits should be included in any economic analyses for road projects.

Example 3: Title: Gully Restoration, Oconee Ranger District, Compartment 169

Source: USDA Forest Service. 1982. Gully Restoration, Oconee Ranger District, Compartment 169. File report, Chattahoochee-Oconee National Forest, Gainesville, Ga.

Problem:

A large gully on land now part of the Oconee National Forest had formed when the land was still in agricultural use. The gully has been invaded by trees and brush, but has still not healed, and erosion and sediment yields are unacceptable. The area of the gully and adjacent land needing treatment is six acres.

Soil and Water Involvement:

Soil and water specialists working with other resource specialists designed the restoration of the gully.

Solution:

Three alternatives for rehabilitation are evaluated: high cost, low cost; and no action. Descriptions follow:

High cost rehabilitation: all timber and brush is cleared from the gully and surrounding area for soil material to fill and shape gully. Fill material is moved into the gully; terraces are constructed, and the gully shaped. After earthwork is completed, the entire area is ripped, disked, limed, fertilized, seeded, fertilized, and mulched. Project protection involves reseeding, refertilization and maintenance for three years after initial treatment, with loblolly pine planted over the entire area three years after the initial earth work.

Low cost rehabilitation: timber is not removed from gully, but is removed from the surrounding area. A ditch is constructed above the head of the gully, with runoff discharged onto a stable soil. The gully is fertilized and seeded with native vegetation. Maintenance is scheduled for three years, including fertilization, spot seeding and ditch repair. Loblolly pine is planted during the second year.

No action alternative: no rehabilitation treatment is provided. Timber is harvested and a plantation is established beyond a 15 foot buffer around the gully.

Rationale:

Costs and benefits associated with restoration, resource management, and resource outputs are based upon District data and experience. The value for sediment reduction was set at $5 per ton, based on reported dredging costs. Wildlife habitat values for different stand ages are

those used in the Forest Plan. The costs for gully restoration, maintenance, tree planting, thinning administration, and clearcut administration are based upon project experience and file data from the Forest.

Pulpwood and sawtimber volumes harvested by thinnings and clearcuts are based upon Forest data and models. The values for pulpwood and sawtimber are based upon stumpage values for timber sold by the Forest.

Economics: Restoration and management of old gullies requires several investments over several years. Returns from these investments occur throughout the first rotation of trees. The sequence of investments and benefits are outlined for each alternative (tables 2, 3, and 4).

Table 2. Economic analysis of high cost gully restoration.

Investments			Benefits	
Year	Description	Cost $/Ac	Year	Description and Revenue
			1	Sediment reduction: 24 tons at $5/ton.
0	Gully restoration	1,800		
1	Maintenance	150	1-5	Wildlife habitat: 10 acres at $71/acre/year.
2	Maintenance	150		
2	Tree planting	75	2	Sediment reduction: 27 tons at $5/ton.
3	Maintenance	150		
30	Thinning admin.	50	2-30	Visual condition: $3/acre for 10 acres for 29 years.
40	Thinning admin.	45		
60	Clearcut admin.	40	3-60	Sediment reduction: 30 tons at $5/ton for 58 years.
			6-10	Wildlife habitat: 10 acres at $41/acre for 5 years.
			11-20	Wildlife habitat: 10 acres at $3/acre for 10 years.
			21-60	Wildlife habitat: 10 acres at $34/acre for 40 years. Understory forage improves.
			30	Thinning: 0.68 thousand board feet (MBF)/acre at $119/MBF; and 3.8 cunits (CCF) at $11.55/CCF for 10 acres.
			40	Thinning: 0.96 MBF/acre at $121/MBF; and 1.7 CCF/acre at $12.10/CCF for 10 acres.
			60	Clearcut: 10.2 MBF/acre at $127/MBF; and 6.5 CCF/acre at $13.31/CCF for 10 acres.

Internal rate of return: 1.9 percent.
Present net value at 4 percent: -$934 per acre.
Benefit/cost ratio at 4 percent: 0.60 to 1.00

Table 3. Economic analysis of low cost gully restoration.

Investments			Income	
Year	Description	Cost $/Ac.	Year	Description and Benefit
0	Gully restoration: Ditch	80	1	Sediment reduction: 6 tons at $5 per ton.
1	Maintenance	60	1-5	Wildlife habitat: $71/acre for 5 years for 10 acres.
1	Tree planting (6 acres)	171	2	Sediment reduction: 12 tons at $5 per ton.
2	Maintenance	60	3	Sediment reduction: 18 tons at $5 per ton.
3	Maintenance	60	4	Sediment reduction: 24 tons at $5 per ton.
30	Thinning admin. (6 acres)	33	5-30	Visual condition: $1/acre for 10 acres for 26 years.
40	Thinning admin. (6 acres)	30	5-60	Sediment reduction: 30 tons at $5 per ton for 56 years.
60	Clearcut admin. (6 acres)	27	6-10	Wildlife habitat: $41 per acre for 10 acres for 5 years.
			11-20	Wildlife habitat: $3 per acre for for 10 acres for 10 years.
			21-60	Wildlife habitat: $34 per acre for 10 acres for 40 years. Understory forage improves.
			30	Thinning: 0.68 MBF/acre at $118/ MBF; and 3.8 CCF/acre at $11.55/CFF for 6 acres. CFF for 6 acres.
			40	Thinning: 0.96 MBF/acre at $121/ MBF; and 1.7 CCF/acre at $12.10 CCF for 6 acres.
			60	Clearcut: 10.2 MBF/acre at $127/ MBF; and 6.5 CCF/acre at $13.31/CCF for 6 acres.

Internal rate of return: 18.0 percent.
Present net value at 4 percent: $885 per acre.
Benefit/cost ratio at 4 percent: 3.0 to 1.0.

Table 4. Economic analysis of no action alternative for gully restoration

Investments			Income	
Year	Description	Cost $/Ac.	Year	Description and Benefit
0	Tree planting (6 acres)	171	1-5	Wildlife habitat: $71/acre for 4 acres for 5 years.
30	Thinning admin. (6 ac.)	55	6-10	Wildlife habitat: $41/acre for 4 acres for 5 years.
40	Thinning admin. (6 ac.)	30	11-20	Wildlife habitat: $3/acre for 4 acres for 10 years.
60	Clearcut admin. (6 ac.)	27	21-60	Wildlife habitat: $34/acre for 4 acres for 40 years. Understory forage improves.
			30	Thinning: 0.68 MBF/acre at $118/MBF; and 3.8 CCF/acre at $11.55/CCF for 6 acres.
			40	Thinning: 0.96 MBF/acre at $121/MBF; and 1.7 CCF/acre at $12.10/CCF for 6 acres.
			60	Clearcut: 10.2 MBF/acre at $127/MBF; and 6.5 CCF/acre at $13.31/CCF for 6 acres.

Internal rate of return: 12.3 percent.
Present net value at 4 percent: $316 per acre.
Benefit/cost ratio at 4 percent: 2.66 to 1.00.

Conclusions:

When selecting the best gully restoration alternative, factors other than pure economics determine the choice. In this situation, other factors to consider are the impacts on warm water fisheries and recreation values that might be affected by sediment.

Based on the economic analysis information displayed in tables 2, 3, and 4, the low cost alternative is the most cost-effective. It might be selected if the sediment yield was below the threshold to impair warm water fisheries and downstream recreation.

If warm water fisheries and recreation were impaired, or were issues with users, the low cost alternative is the most cost effective method to reduce sedimentation. The high cost alternative would be used to solve sediment impacts on high-value fisheries and recreational waters.

Example 4: Title: Restoring Soil Productivity by Respreading Topsoil.

Source: Pacific Southwest Region, USDA Forest Service

Problem:

A problem common to all types of landownership is the impact of site preparation for tree planting on soil productivity. During the process of reducing vegetative competition for tree seedlings, litter and topsoil are sometimes removed and deposited in windrows.

Litter and topsoil contain a large portion of the nutrients needed by trees for growth to sawtimber size. Removing nutrients during site preparation can significantly reduce site productivity and timber yields. Including soil resource management in site preparation projects can help managers retain these nutrients, thus maintaining soil productivity and timber yields and benefiting the timber resource.

This example evaluates the effects on soil productivity and tree growth from the displacement of three or more inches of topsoil during site preparation activities. The site preparation project was designed to remove the seed source for competing plant species.

Tree increment core data reveals that plantations established with this type of site preparation suffer reduced height and volume growth during the 20 years following site preparation. Indications are that this reduced growth will probably persist through the rotation, reducing the future value of the harvest.

Soil and Water Involvement:

A soil scientist can collect and analyze soil samples to determine what nutrients are available for plant growth. With information about the amount of topsoil displacement, the potential (undisturbed) productivity of the site can be determined, and estimates of the amount of soil productivity loss and subsequent tree growth loss can be made.

Analysis of mineralizable soil nitrogen allows the soil scientist to determine the approximate percentage of productivity loss (see the paper by Miles and Powers). To field-verify this relationship between soil productivity loss and and tree growth, increment core samples (to determine inches of radial growth over time) can be taken.

Approaches to Solution:

Two options can be considered to reduce or eliminate this volume/value loss.

The first option is to rehabilitate the plantation by spreading displaced topsoil back to its original position and depth, so the pine

plantation can utilize the nutrients it contains. The second option is to fertilize the plantation every 10 years for the remainder of the rotation.

Rationale:

The soil productivity decline is due to the mechanical removal of the topsoil. Estimated radial growth rate of tree is reduced by 35 percent compared to trees growing on undisturbed soil. Soil analysis of mineralizable soil nitrogen supports the assumption that growth loss is due to the lower availability of nitrogen where topsoil has been removed.

Using a stumpage value of $1.27 per cubic foot for Ponderosa pine (based on data in the Modoc National Forest Plan), a 100-year rotation was used to compare timber growth and yields between options.

The resulting benefit in dollars per acre is a comparison of values for the three alternatives described in table 5. These values are the future value used in the economic analysis.

Table 5. Economic comparison of alternatives for restoring soil productivity.

	Do nothing	Topsoil redistribution	Fertilize every 10 yrs. Age 20-90
Original site productivity rsp^3/ac./yr. at CMAI[1]	55	55	55
Total potential volume ft.^{3})	5,500	5,500	5,500
Stand productivity foregone (lost) during first 20 years growth; and continued loss if no treatment is used.	35%	7%	7%
Wood volume at 100 years (ft.^{3}/ac.)	3,575	5,115	5,115
Stumpage value/ft.^{3}	$ 1.27	$ 1.27	$ 1.27
Stumpage value at 100 years (ft.^{3} stumpage value x volume) (in dollars).	4,540	6,496	6,496
Resulting value of treatments at 100 years (in dollars).	-	1,956	1,956
Present (year 20) value of resulting values discounted at 4 percent	-	$84.86	$84.86
Mitigation costs/ac.	-	$45.00 (at yr. 20)	$60.00 at yrs. 20,30,40,50, 60,70,80,90.
Present 20 year value of mitigation costs.	-	$45.00	$176.91
Internal rate of return		4.82%	2.74%
Present net value (at 4 percent; 20 yr.)		$39.86	$-92.05
Benefit/cost ratio (at 4 percent; 20 yr.)		1.89:1	0.48:1

[1]Culmination of Mean Annual Increment

Conclusion: The topsoil redistribution rehabilitation investment shows:

a favorable benefit/cost ratio;

an IRR greater than the 4 percent alternative rate; and

a positive present net value.

References:

Miles, S.R. & Powers, R.F. "Fertilizing California Forests with Nitrogen - Preliminary Guidelines", November 1983, USDA Forest Service, Pacific Southwest Region, 14 pg., unpublished.

Luckow, K.R., "Plum Ridge Soil Improvement Project", March 1984, USDA Forest Service, Modoc National Forest, 10 pg., unpublished.

Example 5: Title: Reducing Watershed Damage and Regeneration Costs by Planting Seedlings in Logging Slash.

Source: Pacific Southwest Region, USDA Forest Service.

Problem:

Broadcast burning of harvest areas is done by various landowners to:

1) reduce fuel hazard;
2) protect against wildfire through the next rotation; and
3) eliminate slash and competition for planting and survival of seedlings.

Broadcast burning has three soil and water problems associated with it. First, broadcast burns can escape and burn streamside management zones (SMZs). Burned streamside management zones are not as effective in protecting water quality. Second, burning on highly erodible soils increases erosion/sedimentation. Finally, burning may reduce soil productivity.

Costly mitigation measures can be used protect soil productivity and water quality that will increase the cost of site preparation for planting. An alternative slash reduction method is evaluated and compared to broadcast burning.

The alternative needs to reduce fire hazard, reduce regeneration costs, protect soil productivity, and protect water quality.

Soil and Water Involvement:

The soil scientist and hydrologist integrate soil and water resource management into project plans, while meeting the needs of timber resource management. Soil moisture/plant relationship information was utilized in generating alternatives and modifying alternatives to maximize the probability of seedling survival.

Approaches to Solution:

Recently, a "no-burn alternative" for site preparation for seedling establishment has received much attention.

Research in Oregon found that 770 trees per acre could be planted on an 8 by 8 foot spacing in slash of 65 tons/acre (Fir Report 1986). Similar work done on the Hayfork Ranger District of the Shasta Trinity National Forest supports the findings (Glines and Bryant 1986). To consider the no-burn alternative, the risk of wildfire through the rotation must be reduced and seedling establishment must be assured.

Three alternatives were considered.

Alternative 1 involves broadcast burning with protection of streamside management zones (SMZ).

The two other alternatives both involve the no-burn choice and yarding of unmerchantable material (YUM).

Alternative 2 requires YUM of material 15 inches in diameter or larger.

Alternative 3 requires YUM of material 8 inches and larger.

Rationale:

For the purpose of developing this example, the following 1986 cost data was taken from the Forest Plan, file data, and projected experience on the Shasta Trinity National Forest:

an average broadcast burning cost of $350 per acre;

burning costs increase by $450 per acre to protect SMZ;

for YUM (15-inch material) with no-burn: $305 per acre. No broadcast burn costs incurred;

for YUM (8-inch material) with no-burn: $700 per acre. No broadcast burn costs incurred; and

after broadcast burning, hoedad planting at $100 per acre.

The $120 and $130 planting costs for the two YUM alternatives were estimated using the (previously mentioned) average cost of $100 per acre for broadcast burned units, and a $228 per acres figure from an Oregon Bureau of Land Management planting contract, where planting took place in a unit with 65 tons of slash per acre.

In unburned units, fire hazard is greater for the first 10 years. How long this increased hazard persists depends on the vegetation that develops on the site. The amount of time can vary from 5 to 15 years for various brush species. If grass invades the site, the time can be as little as 2 or 3 years.

After 10 years, young trees and brush create a high fire hazard, regardless of earlier treatment. Brush and grass act as a fuel ladder to carry ground fire up into the crowns of young trees.

After 40 years, the fire hazard begins to decrease. As the tree canopy closes, it shades out brush and grass. In addition, the bark of conifer trees starts to become fire resistant, especially in Douglas-fir and Ponderosa pine. Also, fire hazard is a function of the amount of large fuels on the site. YUMing reduces large fuels and reduces fire hazard compared to sites where the material is left.

Average seedling survival is estimated to be greater than 90 percent in both burned and unburned units.

Economics (Least Cost Analysis): cost savings are in todays dollars, therefore discounting does not enter the analysis. Since both no-burn alternatives result in less fire hazard over the rotation and equal tree survival (compared with the baseline alternative), the measure of economic efficiency is the least-cost alternative (table 6).

Table 6. Comparing costs for three alternatives of slash treatment.

Activity	Broadcast Burn and Protect SMZ	YUM 15"+ no-burn	YUM 8"+ no-burn
	Dollars per acre		
Broadcast burn, including slash hand lines and mop up.	350		
SMZ protection	450		
YUM, fell hardwood, lop and scatter		305	700
Planting cost	100	130	120
Totals	900	435	820

In addition to reduced cost, other nonpriced benefits can be attributed to the no-burn alternative. YUM will:

1. make more fuel wood available;
2. protect highly erodible soils form direct rainfall and runoff impacts;
3. assure that site preparation, planting, and survival objectives will be met;
4. meet air quality standards;
5. meet water quality standards;
6. allow planting during the first season after harvest;
7. minimize sprouting of fire-dependent species;
8. allow more flexibility in selecting the shape of the harvest unit (as fire behavior considerations will not have to dictate unit shape);
9. increase assurance of saving snags for wildlife; and
10. distribute the workload throughout the year, reducing the fluctuation in personnel needs.

Conclusions:

Yarding of unmerchantable material is a more cost-effective way to assure protection of streamside management zones. It protects soil

productivity and prevents soil erosion and sedimentation, while reducing fire hazards and allowing rapid establishment of seedlings on clearcuts. Broadcast burning is more costly, and imposes greater risks for streamside management zones during burning operations.

Soil scientists and hydrologists provide a way to mitigate the impacts on the soil and water resource, saving money in the process.

References:

Fir Report, winter 1986. Planting seedlings in slash. Oregon State University Extension Service, Medford Oregon.

Glines John and Jeff Bryant, 1986. Situation statement of fuel management on the Hayfork Ranger District, Shasta Trinity National Forests. Presented at a management team meeting, summer 1986.

Example 6: Title: **Erosion Control/Restoration Project, Plumas National Forest, California.**

Source: Based on Poco Creek Restoration Project, Beckwourth Ranger District, Plumas National Forest (1987). Bob Schultz, Hydrologist.

Problem:

During the preliminary site examination of a proposed 1987 timber sale, a 3,400 acre watershed within the sale area was found to contain severe, active gully erosion caused by past overgrazing and numerous deep cow paths. The stream below has a very unstable channel. To large headcuts (eight and eleven feet in height) have advanced upstream nearly 1,200 feet, leaving a gully 15 feet deep and 40 to 80 feet wide.

Off-site impacts include reservoir sedimentation, and water quality and fish habitat degradation. Additional on-site degradation is expected as the headcuts progress into and destroy a 20-acre wet meadow.

Soil and Water Involvement:

The timber sale plan called for harvest of 310 acres in this watershed. The forest hydrologist analyzed the situation and judged that increased peak flows resulting from harvest would significantly accelerate headcut advancement and lateral cutting, resulting in unacceptable degradation of on- and off-site values. An interdisciplinary team and the District Ranger concurred with this assessment.

Approaches to Solution:

Harvesting the scheduled timber sale without some adjustment was excluded as a viable choice. Two viable alternatives were considered:

1) Eliminate all grazing and other damaging activity from the watershed, and postpone harvesting the three million board feet for 20 years. These actions would give the area time to adequately heal and stabilize.

2) Construct a series of rock check dams in the existing gully raising the channel bottom to maintain a maximum 4 percent gradient between check dams. All fill material would be of sand-gravel filter quality. To stabilize the cow paths and the gully, fence cattle out of the area containing the deep cow paths, and also out of the area around the check dams.

Rationale:

The first alternative, eliminating grazing and postponing the harvest cut, would have four easily quantifiable costs:

a) the cost of postponing the harvest of 3.014 million board feet ($1,293,000 at a weighted stumpage value of $429/MBF) for 20 years;

b) the cost of dredging a downstream reservoir of the continuing (though declining) sedimentation ($30,000 in the year 1990 and $190,400 in the year 2015);

c) the cost of relocating a short segment of road (in 1992) that will be threatened by the gully erosion ($2,500); and

d) the cost of reconstructing an existing check dam in 1995 that will be destroyed by the gully erosion ($20,000).

This alternative will cause other associated value losses related to grazing and fisheries. However, grazing losses will be minimal compared to the costs already quantified, and quantifiable fishery costs are not currently available.

The second alternative, constructing erosion control check dams, will cost an estimated $110,000, including project planning and design, plus the following yearly maintenance costs:

1st year	$5,000
2nd year	2,000
3rd - 20th year	1,000

This alternative will solve the erosion problem within a year of it's completion, including any accelerated erosion caused on the watershed by the planned harvest. Under this alternative, postponing the harvest is not necessary.

Economics:

The costs of harvest postponement (alternative 1):

Value of harvest if cut today (1987):	$1,293,000	
Value of harvest if postponed (discounted) 20 years (at 4 percent):	$590,000	
Difference in present value (value loss), $1,293,000 - $590,000:	$703,000	
Costs of dredging reservoir in 1990 and 2015 (discounted to the present at 4 percent):		$ 90,500
Cost of road relocation in 1992 (discounted to the present at 4 percent)		$ 2,050
Cost of reconstructing check dam in 1995 (discounted to the present at 4 percent):		$ 14,600
		$810,150

This $810,150 is the potential benefit from the second alternative, which solves the erosion problem and allows an unpostponed harvest cut.

Costs of erosion control (alternative 2):

Project planning, design and construction:	$110,000
Present value of annual maintenance (discounted at 4 percent)	18,350
	$128,350

Conclusions:

The present cost of constructing a series of rock check dams and maintaining them for 20 years (alternative 2) is $128,350. Opting for this alternative saves the costs of waiting 20 years for nature to heal the problem as outlined under alternative 1. The present value of these savings: $810,150.

The present net value (PNV) of alternative 2 over alternative 1 is $681,800.

The benefit-cost ratio (B/C) of alternative 2 is 6.31 to 1.0.

Assuming that all cost figures are true and correct, and that no major costs have been overlooked, there is no doubt that constructing the rock check dams is economically a better choice than postponing the harvest cut.

Example 7: <u>Title</u>: Prevention and/or Restoration of Soil Compaction

<u>Source</u>: Research paper: John Helms' study of soil compaction and stand growth on the Foresthill Ranger District, Tahoe National Forest, California. March, 1983.

<u>Problem</u>:

Tractor yarding of Ponderosa pine in northern California causes significant soil compaction of skid trails. Trees growing on or near skid trails suffer reduced height and diameter growth over the next rotation, thus reducing future harvest volume and value. Are there economical harvest systems or mitigation measures available for reducing soil compaction and maintain timber growth and yields?

<u>Soil and Water Involvement</u>:

A soil scientist can generate alternatives for preventing or reducing soil compaction and negative effects on tree growth. Aerial extent of the compacted ground and soil bulk density measurements can be provided by a soil scientist. Using Froehlich's (1984) curve, height growth loss can be estimated from the percentage increase in bulk density over natural conditions.

<u>Approaches to Solution</u>:

Two alternatives are evaluated for reducing or eliminating soil compaction and timber volume/value loss. Alternative 1 is to replace tractor yarding with cable yarding. Though cable yarding is more expensive than tractor yarding, the reduction in volume/value loss over the next rotation may offset the resulting decreased stumpage value due to higher yarding costs.

Alternative 2 is to use tractor yarding followed by rehabilitation of the skid trails and other compacted areas using a winged subsoiler ripper.

<u>Rationale</u>:

Average logging area compacted:

tractor yarding: a goal of 20 percent compacted ground is a reasonable maximum for tractor logging.

cable yarding: area compacted by cable logging was set at 2 percent based on a logging engineer's estimate of width, length, and distance between cable ways.

tractor/ripping: Andrus and Froehlich (1983), found up to 90 percent of compaction can be alleviated by making one pass with a winged subsoiler. (90 percent of the 20 percent compacted ground leaves 2 percent of the ground still compacted.

Degree of compaction: Helms (1986) found uncompacted soil had a bulk density of .83, and compacted soil had a bulk density of 1.25. Because no equipment is on the ground, cable yarding causes less compaction, thus bulk density was estimated at 1.12 for cable logging.

Height growth loss: Froehlich and McNabb (1984) developed a relationship for estimating height growth loss form percent increase in soil compaction. For example, a 51 percent increase in soil density translates to a 35 percent decrease in height growth.

Weighted height growth loss: Because the productivity loss is associated only with the compacted ground, the weighted loss is calculated by multiplying the percent area compacted by the percent height growth loss.

Resulting site index: Site index is reduced to reflect the loss in productivity attributed to compaction. For example, a site with an index of 100 that has lost 7 percent in height growth results in a site index of 93. Growth and yield tables are use to estimate wood volume losses.

Volume at 50 years (cu.ft./ac.): From yield tables, Oliver and Powers (1978). Because yield tables are organized for even increments, interpolation of the yield between site index 80 and 100 is necessary (i.e., a site index of 80 at 50 years (12 x 12 ft. spacing) yields 7,472 $ft.^3$. A site index of 100 yields 10,766 ft.3.

$10{,}766 - 7{,}472 = 3{,}294\ ft.^3$.
$3294/20 = 165\ ft.^3$ per site index point.

Therefore, in the tractor example, for site index 93:
$10{,}766 - [(165)(7)] = 9{,}611\ ft.^3$.

Cubic foot wood value - logging cost:

In the draft Forest Plan for the Shasta Trinity National Forest, Ponderosa pine was valued at $1.53 per cubic foot.

A logging engineer converted costs for both cable and tractor methods were converted from costs per thousand board feet to costs per cubic foot of wood.

The wood value for each logging system is computed by subtracting the logging cost from the wood value. (The value of $.25 per cubic foot for tractor yarding is based on a logging cost of $50/thousand board feet. The value of $.43 per cubic foot for cable yarding was based on $85/thousand board feet costs.)

Value at 50 years: this is simply the cubic wood value times the volume at 50 years.

Resulting benefit ($/ac.): This is a comparison of values for different alternatives. In this example, both cable yarding and

tractor yarding with mitigation are compared with tractor yarding alone. These values are the "future value" used in the economic analysis.

Mitigation cost: Cable logging mitigation is reflected in the increased logging costs.

Ripping skid trails cost $26.40 per acre based on Andrus and Froehlich (1983). This is based on costs of $132.00 per acre of skid trail, with 20 percent of the ground compacted, i.e., $132 x 20% = $26.40.

Economics: Timber resource outputs and economics of each logging system are compared in table 7.

Table 7. Comparison of logging systems on growth and yields and economic benefits.

	Tractor yarding	Cable yarding	Tractor + ripping
Percent area compacted:	20%	2%	2%
Degree of compaction (BD)	.83--1.25 (51% increase)	.83--1.12 (35% increase)	.83--1.25 (51% increase)
Height growth loss (Froehlich's curve)	35%	24%	35%
Weighted height growth loss	.20(35)= 7%	.20(24)= .5%	.20(35) =.7%
Resulting site index	93.0	99.5	99.3
Volume at 50 years (ft.^{3}/ac.) (Oliver and Powers)	9,611	10,684	10,651
Yarding cost per cubic ft.	$.25	$.43	$.25
Wood value - logging costs (per cubic foot)	$1.53 - $.25 =$1.28	$1.53 - $.43 = $1.10	$1.53 - $.25 = $1.28
Value at 50 years (Cu. ft. value x volume)	$12,302	$11,752	$13,634
Resulting benefit per acre		$-550	$1,332
Mitigation cost per acre		$2,191	$26.40
Internal rate of return		*	8.16 %
Present net value (at 4%)		$-2,268	$161.03
Benefit/cost ratio (at 4%)		-28.3:1	7.1:1

* A negative value.

Conclusions:

The cable yarding alternative is not an economically viable option due to high yarding costs and the small increment of increased timber yield at the end of the rotation. The skid trail rehabilitation alternative is a viable option, with an internal rate of return of 8.16 percent above inflation.

Discounted at any real rate below 8.16 percent, this alternative will yield a positive present net Value and a benefit/cost ratio greater then 1.0. Assuming an inflation rate of 3 percent, this alternative will pass both the Water Resources Council's 7-3/8 percent return rate and the Office of Management and Budget's 10 percent return rate.

References:

Andurs, C.W., and H.A. Froehlich. 1983. Tilling compacted forest soils in the Pacific Northwest. Forest Research Laboratory Res. Pap., Oregon State University, Corvallis.

Froehlich, H.A., and D. H. McNabb. 1984. Managing soil compaction in the Pacific Northwest. In: E.L. Stone, Jr. (ed.). Proc. Sixth North American Forest Soils Conference, July 19-23, 1983. Knoxville, Tennessee.

Helms, J.A., C. Hipkin and E.B. Alexander. 1986. Effects of soil compaction on height growth of a California Ponderosa Pine plantation. Western Journal of Applied Forestry, 1:104-108, Oct. 1986.

Oliver, W.W. and R.F. Powers. 1978. Growth Models for Ponderosa Pine: I. Yield of unthinned plantations in northern California. Res. Paper PSW-133, 21 p., illus. Pacific Southwest Porest and Range Exp. Stn., Forest Serv., U.S. p. Agric., Berkley, Calif.

Example 8: **Title: Impact of Site Preparation On Timber Growth and Yields**

Source: George E. Dissmeyer and Bennett Foster, Soil Water and Air, and Cooperative Forestry, Southern Region, Atlanta, Georgia

Problem:

The way a site is prepared for tree planting can significantly affect soil productivity and timber growth and yields. Site preparation practices that compact the soil, remove forest litter, and remove nutrients adversely impact soil productivity.

Soil and Water Involvement:

Soil scientists review site preparation prescriptions and recommended treatments to conserve soil productivity. Soil scientists have trained foresters employed by the Forest Service, the states, and industry in the basics of soil and water conservation. They demonstrated that this pays dividends in increased timber growth and yields. As a result, there is a growing trend in using site preparation practices that conserve soil productivity.

Solution:

A large proportion of site preparation in the South is done using shearing and windrowing or bulldozing and windrowing. Research on the impacts of these practices on timber growth and yields showed that they reduced site index by as much as 14 feet, compared to soil conserving practices. Soil and water specialists utilized training, project reviews, and other methods to get this message to foresters. Many foresters had the same concerns, and were quick to employ better site preparation practices.

Rationale:

Dissmeyer (1985) summarized the principles of soil productivity and the impacts of site preparation on soil productivity and timber yields.

Research on the impacts of site preparation on soil productivity has demonstrated that site index can be reduced by as much as 14 feet by treatments that remove topsoil, remove litter and compact the soil. For the purposes of this example, shearing and windrowing was compared with chopping and burning.

The growth difference between treatments was assigned a conservative 5 feet. Patterson (1984) used the 5 foot difference in his analysis of growth and yield differences for loblolly pine. Patterson data is reported in this example.

Economics: Patterson used a site index of 70 feet for chopping and burning (table 8), and 65 feet for shearing and windrowing (table 9). He used a growth and yield model to predict the differences in productivity for a 36-year

rotation with 600 trees per acre. Stumpage prices used were $10 per cord of pulpwood and $100 per 1,000 board feet of sawtimber. A 4 percent discount rate was used.

Table 8. Alternative 1. Site preparation with chopping and light burn.

Year	Description	$ Amount/Acre	Wood Volume/Acre
1984	Site prep & planting cost	$120	
1999	Thinning income	102	10.2 Cords
2010	Thinning income	213	5.3 Cords & 1,600 Bd. Ft.
2020	Final harvest income	979	2.5 Cords & 9,541 Bd. Ft.

Internal rate of return: 8.1 percent.
Present net value (at 4 percent): $252.
Benefit/cost ratio (at 4 percent): 3.1 to 1.0.

Table 9. Alternative 2. Site preparation with shearing and windrowing.

Year	Description	$ Amount/Acre	Wood Volume/Acre
1984	Site prep & planting cost	$170	
1999	Thinning income	73	7.3 Cords
2010	Thinning income	134	9.6 Cords & 377 Bd. Ft.
2020	Final harvest	838	3.5 Cords & 8,029 Bd. Ft.

Internal rate of return: 5.8 percent.
Present net value per acre (at 4 percent): $123.
Benefit/cost ratio (at 4 percent): 1.72 to 1.00.

Conclusions:

Investing $50 per acre more in preparing the site with shearing and windrowing reduced the present net value by $129 per acre, compared to chopping and burning.

Shearing and windrowing reduced the rate of return from tree growth by 2.3 real percentage points, and reduced the Benefit/Cost Ratio from 3.10 to 1.00 to 1.72 to 1.00. The 5 foot decrease in site quality resulted in less sawtimber and more pulpwood per acre.

Conversely, maintaining site quality by employing chopping and burning yielded larger trees and more valuable products.

References

Dissmeyer, G. E. 1985. Economic impacts of erosion control in forests. In: Proceedings Southern Forestry Symp. Nat. Assoc. of Prof. Forestry Schools and Colleges. November 19-21, 1985, Atlanta, Ga. (In Press).

Patterson, T. 1984. Dollars in your dirt. Alabama Treasured Forests. Spring 1984:20-21.

Example 9: Title: Forest Fertilization

Source: Ken Luckow, Modoc National Forest, Timber Stand Nutrient Status Inventory, March, 1986.

Problem:

Soil and foliar analysis revealed that most true fir and many Ponderosa pine stands on the Modoc National Forest in northeastern California are deficient in nitrogen. Also, many of these stands are deficient in sulfur. Because of these nutrient deficiencies, stands grow more slowly, reducing future harvest volume and value.

Soil and Water Involvement:

Using preliminary guidelines developed for fertilizing California forests (Miles and Powers 1983); the soil scientist and silviculturists on the Modoc National Forest prioritized and sampled over 50 timber stands for soil and foliar nutrient content.

These stands represented many of the Benchmark timber/soil types on the Modoc National Forest. Mineralizable soil nitrogen was used to predict the percent response to fertilization. Nitrogen and six macro-nutrients were analyzed in the foliage samples to help verify the soil nitrogen test, and to determine possible secondary nutrient deficiencies.

Using the soil resource inventory, stand record cards, and other on-site timber information and abiotic factors, the soil scientists and silviculturists determined basal area, average DBH, age of stand, timber site class, and cubic feet of standing wood volume.

Approaches to Solution:

Determining if forest fertilization is economically viable: for the purposes of this example, candidate timber stands had to be within 20 years of a commercial thinning, or 40 years of final harvest.

The sooner a harvest follows the effective period of fertilization, the greater the economic return. Timber stands selected were primarily pole- to young saw timber size, precommercially thinned Ponderosa pine or white fir. Growth response induced by fertilization was estimated using nutrient status information and Meyer and Schumacher site index and volume tables.

Rationale:

Break-even analysis was used to evaluate the economics of investments in forest fertilization using a 4 percent real interest rate (Fight). In this example, the break-even point is a break-even year--where the number of years the stand could grow for the fertilization investment to be equal to, or break-even with, the 4 percent discount rate.

If the stand were harvested before that time the investment would pay more than 4 percent. If the stand were harvested after that time, the investment would pay less than 4 percent.

In the Modoc National Forest Plan the stumpage value for a cubic foot of white fir is $.75, and $1.27 for a cubic foot of Ponderosa pine.

Foliar macro-nutrient analysis indicated that sulfur was a commonly deficient nutrient on the Modoc National Forest. Thus, all forest fertilization projects would include a combination of nitrogen plus sulfur fertilizer. The cost was $75 per acre.

Economics: From table 10, all four stands will result in favorable fertilization investments. The highest priority stand with the most favorable investment return is stand #24 followed by #29, #41, and #8.

Stand #24 ranks highest because it generates the greatest increase in value ($617) and can be harvested in five years, since it is larger than the minimum required DBH for harvesting. In addition, the rate of return for stand #24 will not drop below the 4 percent rate for 53 years, indicating that its rate of return is rather large.

Stand #29 ranks second in priority because it can also be held for 53 years before its rate of return will drop below 4 percent. However, it generates slightly less increase in value ($610). There is a 10 year wait until it reaches a minimum standard DBH for harvesting.

Stand #8 is given the lowest priority, even though it generates a greater increase in value ($300) than stand #41 ($236). The reason is that it will be 20 years before the stand reaches the minimum DBH for harvesting, compared to 10 years for stand #41.

Table 10. Economic comparison of 4 candidate timber stands for fertilization.

		Stand #24	Stand #41	Stand #8	Stand #29
A.	Species	P. Pine*	P.Pine	W. Fir**	W. Fir
B.	Site index (Meyers--P. Pine; Schumacher--W.Fir)	90	80	40	50
C.	Basal Area (ft.^{2})	120	115	110	200
D.	Average DBH (inches)	15	10	8	11
E.	Stems per acre	100	210	315	300
F.	Average Age (Years)	70	80	80	70
G.	Current Stand Volume (ft^3)	2,800	2,241	1,733	4,500
H.	Projected Unfertilized Stand Volume Next Decade (ft^3) (Meyers 1938)	4,188	3,480	2,964	6,534
I.	10 Year Volume Increment (ft^3)	1,388	1,239	1,231	2,034
J.	Predicted 5 year Volume response to Fertilization (percent) (Miles & Powers 1983)	35	15	33	40
K.	5-year volume response Due to Fertilization (ft^3)	486	186	400	814
L.	Wood Value Per ft^3	$1.27	$1.27	$.75	$.75
M.	Added Value from Fertilization	$617	$236	$300	$610
N.	Fertilization cost/acre	$75	$75	$75	$75
O.	Economic break-even Year (at 4 percent real interest rate)	53.5	53.5	29	35
P.	Years to Reach Merchantable Size if Fertilized	0	10	20	10
Internal rate of return:		52.4%	12.2%	7.2%	23.3%
Present net value (at 4 percent):		$432.13	$84.43	$61.92	$337.09
Benefit/cost ration (at 4 percent):		6.76	2.13	1.83	5.49
Priority:		1	3	4	2

* P. Pine is Pondersa pine.

** W. Fir is white fir.

Conclusions:

These conclusions have been reached to a significant degree using intuitive reasoning. However, their validity can be shown using the following quantitative methodology:

Priority 1: Stand #24 generates its $617 value after five years, yielding and IRR of 52.4 percent, a PNV (4 percent) of $432.13, and a B/C Ratio (4 percent) of 6.76 to 1.00.

Priority 2: Stand #29 generates its $610 value after ten years yielding an IRR of 23.3 percent, a PNV (4 percent) of $337.09, and a B/C Ratio (4 percent) of 5.49 to 1.00.

Priority 3: Stand # 41 generates its $236 value after ten years, yielding an IRR of 12.2 percent, a PNV (4 percent) of 84.43, and a B/C Ratio (4 percent) of 2.13 to 1.00.

Priority 4: Stand #8 generates its $300 value after 20 years, yielding an IRR of 7.18 percent, a PNV (4 percent) of $61.92, and a B/C Ratio (4 percent) of 1.83 to 1.00.

An additional economic benefit, which has not been discussed here, is the shortening of the rotation period for growing trees to a target size. It has been calculated that the use of fertilization one or more times can shorten the rotation period by one or more decades. This would have a very favorable economic effect, considering all costs, from plantation establishment to final harvest.

References:

Fight, R.D., "Economics of Forest Fertilization in the Pacific Northwest" Presented at the California Conference on Forest Tree Nutrition and Soil fertility. May 19-20, 1980, Redding, Ca. 5pg, unpublished.

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Miles, S.R. and Powers, R.F., "Fertilizing California Forests with Nitrogen - Preliminary Guidelines," November, 1983, USDA Forest Service, Pacific Southwest Region, 14 p., unpublished.

Schumacher, F.M., "Yield, Stand, and Volume Tables for White Fir in the California Pine Region", Oct. 1926, University of California College of Agriculture, Agricultural Experiment Station, Berkeley, California, Bulletin 407.

Example 10: Title: Bedding and Phosphorus Fertilizing Loblolly Pine Plantations

Source: Drawn largely from Gent, J.A., Jr., H.L. Allen, R.G. Campbell, and C.G. Wells. 1984. Magnitude, duration; and economic analysis of loblolly pine growth and response following bedding and phosphorus fertilization. NCSFFC Report No. 17. School of Forest Resources, N.C. State University, Raleigh. 28p.

Problem:

Many forest soils of the lower coastal plain of the Southeast U.S. are poorly drained and extremely deficient in phosphorus. The poorest soils have site indices around 55 (50-year base). On 25-year rotations, these sites yield about 18 cords per acre. At stumpage prices of $15 per cord and regeneration costs of $100 per acre, these sites barely yield a minimum acceptable return of 4 percent.

Soil and Water Involvement:

Soil scientists suggest modifying the site physically to improve soil aeration by bedding and to modify the site chemically with phosphorus fertilizer. Bedding is the continuous piling of soil into mounds 3 to 4 foot wide and 4 to 8 inches high. Seedlings planted on top of these mounds are raised above ground water level, and natural soil fertility is concentrated in the area where they are planted.

Research has demonstrated that this combination of treatments on these lower coastal plain soils significantly improves timber growth and yields.

Approaches to Solution: Bed and fertilize to prepare soil for tree planting.

Rationale:

Research has documented height growth responses ranging from 8 to 15 feet greater than on untreated sites. Height growth increase responses translate directly into increases in site index.

Bedding one year before planting adds about $40 per acre to the site preparation cost. Phosphorus fertilization (300 lbs./acre) adds about $25 per acre to the cost of planting.

Stumpage values in the Southeast U.S. range from $10 to $25 per cord, depending on the market. A conservative average value of $15/cord is assumed for purposes of this example.

The following table contains the loblolly pine volume yields from various site indexes, based on an average of various yield tables in current use in the area.

S.I. (year 50)	Tot. vol. per acre untreated (cords)	Tot. vol. per acre from 10 ft. ht. increase (cords)	Vol. increase (cords)	Tot. vol. per acre from 15 ft. ht. increase (cords)	Vol. increase (cords)
55	18	33	15	39	21
60	23	36	13	41	18
65	30	41	11	45	15

Economics: The table below displays increased future values per acre of pine when a site that has been bedded and fertilized.

Site index changes of 10 and 15 units (feet) are shown.
Bedding costs are $40/acre.
Fertilization at the time of planting costs $25/acre.
Current value of stumpage is $15/cord.

Inflation assumed to affect all values. Therefore, changes reflected are only those over and above inflation.

Bedding cost ($40) is incurred in year 0; fertilization cost ($25) is incurred in year 1; and value increases in year 26. The alternative rate of return (discount rate) is 4 percent.

	10 Foot Increase in Site Index				15 Foot Increase in Site Index			
	Value incr. due to a 10 ft. incr.	Econ. return on $65 cost incr. at 4 percent disc. rate			Vol. incr. due to a 15 ft. incr.	Econ. return on $65 cost incr. at 4 percent disc. rate		
S.I.	in S.I.	IRR	PNV	B/C	in S.I.	IRR	PNV	B/C
55	$225	4.96%	$17.12	1.27	$315	6.35%	$49.58	1.77
60	195	4.38%	6.30	1.10	270	5.71%	33.35	1.52
65	165	3.70%	-4.52	0.93	225	4.96%	17.12	1.27

Conclusions:

Apparently, lower site soils respond better to bedding and phosphorus fertilization. If land with a site index of 65 or above responds with only a 10-foot height increase, the treatment does not pay.

Bedding and fertilizing sites with site indices of 55 to 65 are justified if this action results in 15-foot height growth increases. The treatment is not justified if only a 5-foot height growth increase results.

References:

Allen, H.L. and R. Ballard. 1982. Fertilization of loblolly pine. pp. 163-81. Symposium on the Loblolly Pine Ecosystem (East Region). North Carolina State Univ., Raleigh, NC 335 p.

Gent, J.A., Jr., H.J. Allen, R.G. Campbell, and C.G. Wells. 1984. Magnitude, duration, and economic analysis of loblolly pine growth response following bedding and phosphorus fertilization. NCSFFC Report No. 17. School of Forest Resources, N.C. State Univ., Raleigh, NC 28 p.

Hafley, W.L., W.D. Smith, and M.A. Buford. 1982. A new yield prediction model for unthinned loblolly pine plantations. Tech. Rep. No. 1. Sou. For. Research Center., N.C. State Univ., Raleigh, NC 65 p.

NCSFFC. 1984. North Carolina State Forest Fertilization Cooperative. Thirteenth Annual Report. Sch. of For. Resources, N.C. State Univ., Raleigh, N.C. 32 p.

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Pritchett, W.L. and N.B. Comerford. 1982. Long-term response to fertilizer on selected southeastern Coastal Plain soils. Soil Sci. Soc. Amer. J. 46:640-644.

Example 11: Title: Timber Species Selection for Sandhill Region of Florida

Source: The example is based on "Options for Management of Sandhill Forest Land," a paper by R. H. Brendemuehl. The paper compares height growth and survival of several timber species grown on deep sand soils.

Kenneth W. Outcalt, Southeastern Forest Experiment Station, Olustee, Florida, supplied unpublished height growth and volume equations for sand pine.

David Belcher, Southern Region, Atlanta, Georgia, projected timber growth and yield data using the Southern Region Growth and Yield System (yet to be published).

Olen E. Aycock, Southern Region, Atlanta provided cost and product value data used in the analysis.

Species recommendations are based upon soil interpretations presented in the "Guide to Classification and Management of Southeastern Coastal Plain Forest Soils", prepared by the Cooperative Research in Forest Fertilization (CRIFF) organization at the University of Florida (Comerford and Mollitor 1982).

Problem:

Deep, droughty sand soils occupy a significant area of the Sandhill Region of the southern Coastal Plain. Planting the wrong species of trees (slash or loblolly pine) on these soils has resulted in wasted investments in site preparation and planting costs, because plantations of these species quit growing and die before they produce commercially valuable products.

Soils data and interpretations were not used in selecting the appropriate species for deep sands. These sands are over six feet deep and have very low nutrient reserves. Sand and longleaf pine are the recommended species for deep sands.

Soil and Water Involvement:

Soil scientists classify and map soils, and make species suitability recommendations for each soil based upon guidelines such as Comerford and Mollitor (1982). Soil scientists provide training in identifying these deep sands in the field, and in using soil/species suitability guidelines.

Approaches to Solution:

Soil scientists can continue to map soil, make species suitability recommendations and provide training. On National Forests, they can participate in and review timber prescriptions for soil/species suitability.

Rationale:

Comerford and Mollitor's (1982) guide recommends planting sand or longleaf pine on deep sands. Slash pine is not recommended, but has been planted here and produced no return to the landowner. After 15 years, slash pine growth rate is retarded. The landowners recognized they made a mistake in establishing slash pine.

In this example, the 15-year old slash pine is destroyed, and sand pine is planted and grown to a 35-year pulpwood rotation. Because the slash/sand pine scenario covers 50 years, it can not be directly compared to 70 year scenarios for sand pine and longleaf pine.

Economics: Two pulpwood rotations for sand pine were compared to one sawlog rotation for longleaf pine (table 11). The pulpwood rotations were 35 years and the sawlog rotation was 70 years.

Both species are recommended for these soils. Both were established (at 500 trees per acre) using site preparation.

Sand pine is established after scarification and spot seeding, at a cost of $50 per acre. Longleaf pine requires intensive site preparation to reduce competition and to facilitate machine planting. To establish longleaf pine, shearing, windrowing, and disking are performed, followed by machine planting. The cost for establishing longleaf pine is $220 per acre. The cost for soil scientist input for the project is $5 per acre.

Sand pine is grown for 35 years, then harvested without any thinnings. Revenue from each harvest is $1,619 per acre, with sale administration costs of $15 per acre.

Longleaf pine receives two thinnings: one precommercial thinning at age 25 at a cost of $50 per acre; and a commercial thinning (with a stumpage value of $593 per acre and administrative costs of $18 per acre) at age 40.

The stumpage value of longleaf pine at final harvest is $2,476 per acre, with an administrative cost of $15 per acre. Sawtimber stumpage was valued at $125 per thousand board feet, and pulpwood stumpage at $35 per cunit (CCF).

Brendemuehl's (1981) data was used to project height growth differences between species and tree mortality. Brendemuehl reports that sand pine was 50 feet tall at 25 years and longleaf was 34 feet. These height/age data points were entered into the Southern Region Growth and Yield System to estimate growth and yields for the two species.

On first impression, it would appear more economical to grow sand pine on pulpwood rotations than to manage for longleaf. National Forests, however, manage timber for more than just wood fiber. Forests are also directed to manage for other benefits, including wildlife, aesthetics, and recreation.

Managing longleaf pine over the length of a sawlog rotation provides these resource opportunities, while sand pine grown for pulpwood will not.

For a complete comparison of the benefits of managing each species on National Forests, the cost of management and the value of rare and endangered species, wildlife, aesthetics, and recreation of each situation would need to be

considered. However, for private and industry ownerships, the strictly economic comparison might be valid. Here, sand pine would provide greater economic returns to the landowner.

Table 11. Economic analysis of growing sand and longleaf pine in deep sands.

	sand pine			longleaf pine		
Year	Description	Cost	Income	Description	Cost	Income
		$/Ac	$/Ac		$/Ac	$/Ac
0	Soils input	5		Soils input	5	
	Site prep. & seed	50		Site prep. & plant	220	
25				Precommercial thin.	50	
35	Sale administration	15				
	Clearcut (4,625 cu. ft.)		1,619			
	Site prep. & seed	50				
40				Commercial thinning (1,694 cu. ft.)		593
				Sale administration	18	
70	Sale administration	15		Sale administration	15	
	Clearcut (4,625 cu. ft.)		1,619	Clearcut (19,391 bd.ft.) (& 148 cu.ft.)		2,476
	Internal rate of return: 10.1%			Internal rate of return: 4.24%		
	Present net value (at 4%): $442			Present net value (at 4%): $34		
	Benefit/cost ratio (@ 4%): 7.1 to 1.0			Benefit/cost ratio (at 4%): 1.14 to 1		

Planting Slash Pine Off-site on Deep Sands

Planting the wrong species on these deep sands and later discovering the mistake gives a different economic result. It is improper to make a direct comparison between this analysis and the above analyses, because the time frames are different and can lead to misinterpretation.

Many private and industrial landowners planted slash pine on deep sands, only to discover after 15 years that they have made a serious mistake--the plantations have stopped growing and are disintegrating.

Many owners chose to destroy the slash pine and replant with sand pine (table 12). Costs associated with this decision include carrying the original investment in the unproductive plantations for 15 years. Also, no income is received when the plantation is destroyed. Initial site preparation to establish slash pine often employs double chopping, fire and planting, which costs approximately $175 per acre.

Table 12. Economic analysis of off-site planting of slash pine followed by sand pine

Year	Description	Cost	Income
		$/Ac	$/Ac
0	Site prep. & planting (Slash pine)	175	
15	Site prep. & planting (Destroy first plantation and establish sand pine)	100	0
50	Sale administration	15	
	Clearcut (4,625 cu. ft.)		1,619

Internal rate of return: 3.95 percent
Present net value (at 4%) -$4.82
Benefit/cost ratio (at 4%): 0.98 to 1.0

When the first plantation is destroyed, the site is prepared for the sand pine plantation. The example assumes that first stand is chopped, burned, and replanted at a cost of $100 per acre.

Sand pine is managed on a 35 year pulpwood rotation when it is clearcut, yielding $1,619 per acre in revenue with an administrative cost of $15 per acre. No thinnings are made during the rotation.

By catching the mistake at age 15 and reinvesting in sand pine, the landowner essentially breaks even on his investments. If he had not changed to sand pine, he would have invested in slash pine and received very little or no return on the investment.

Conclusions:

Soil interpretations for tree species suitability can be analyzed for economic returns. The species selected for a given site can result in significant differences in income to the landowner.

References:

Brendemuehl, R. H. 1981. Options for management of sandhill forest land. South. J. Appl. For. Vol. 5, No. 3, pg. 216-222.

Comerford, N. B. and A. V. Mollitor. 1982. Guide to classification and management of southeastern coastal plain forest soils. Cooperative Research in Forest Fertilization, Univ. of Fla., Soil Sci. Dept., Gainesville, Fla., 85pg.

Example 12: Title: Range Management, Sedimentation and Fisheries.

Source: Stanley Basin Analysis, Sawtooth National Forest, Sawtooth National Recreation Area, 1986.

Problem:

The application of watershed measures to reduce sedimentation of streams that are used by fish for spawning has a cost. Often the cost is the only issue discussed for these activities with little attention to the values that result. Though the costs of applying these practices can be computed, the resulting values are often difficult to determine.

Best management practices for activities such as grazing, road building and timber harvesting have been developed through experience and research. Models have been developed which can be used to compare the relative difference in sediment production and impacts on fish for various alternatives (figure 1).

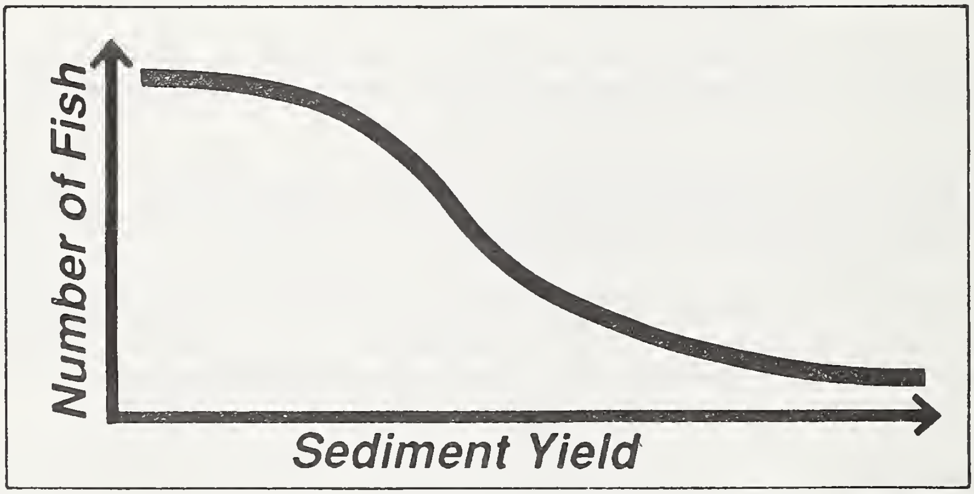

Figure 1 a conceptual model demonstrating the effects of sediment on fish populations.

Soil and Water Involvement:

Increasing concerns about and demands for anadromous fisheries has required Forests to develop or consider direction in their Forest plans that would coordinate fisheries with other resource management.

In this example, to reduce sedimentation and induce anadromous fisheries outputs, the Sawtooth National Forest developed riparian standards and guidelines for a grazing allotment. Field data relating estimates of sediment on the streambeds to the density of chinook salmon and steelhead was collected for stream segments in grazed and ungrazed areas.

Approaches
to the Problem:

The Forest conducted an economic analysis showing estimates of increased fisheries output associated with implementing riparian standards and guidelines. These riparian standards and guidelines include soil and water, fisheries, wildlife, and recreation values.

Implementation of the riparian standards and guidelines on the allotment required either a reduction in the number of Animal Unit Months (AUM's) on the allotment or several miles of fencing. This reduction would improve the riparian areas and reduce sedimentation of the streams resulting from surface runoff and mechanical breakdown of stream banks.

Mathematical models exist for evaluating various alternatives and sediment mitigation practices. These models can estimate relative differences in amount of sediment produced by the activities, and the resulting effects on fish populations.

The following formula can be used to determine the reduction in sediment as a result of the application of watershed protection measures. In most cases, some type of best management practice would be applied to management activities. Thus, the increase in benefits attributed to watershed protection should be related to those measures which exceed the minimum applied practices.

$$[(SED_n + SED_{mm})] - [(SED_n + SED_m)] = \text{reduced sediment.}$$

SED_n = natural or background sediment.

SED_{mm} = minimum managed sediment from development (application of the minimum practices should be assumed).

SED_m = managed sediment through application of BMPs

A variety of studies have been done to determine the value of fish. While studies have been done for sport fisheries, studies for commercial fisheries have the strongest supporting information. This is particularly true for the anadromous salmon fishery.

The following information on the value of salmon was developed by the American Fisheries Society (see Special Publication No. 13, 1982). Values for most freshwater game, nongame, and commercial species are included in this publication.

<u>Rationale</u>:

Supporting information:

1) field data was collected from both grazed and ungrazed stream reaches;
2) sediment sources: overland transport and mechanical breakdown of stream banks;

3) alternatives ranged from fencing to reductions and/or removal of livestock;

4) induced anadromous fisheries outputs were calculated using field data for both chinook salmon and steelhead; and

5) cost savings included the reduced need for structural range and watershed improvements.

<u>Economics</u>: Using a discount rate of 4 percent over the 20-year project period, implementation of this alternative reduced AUM value by $789,900 (a cost).

The resulting benefit to fisheries was $1,806,100, based on an increase of 61,453 juvenile chinook salmon and 2,866 steelhead produced after sedimentation reductions occurred. Further benefits were obtained through reduced investments and operational costs of $1,891,300.

The benefit/cost ratio for this selected alternative is 17:1.

<u>Conclusions</u>:

Implementation of forest plan standards and guidelines that protect water quality can result in significant economic benefits from the fishery resource. It is significant in this example that the economic return from the increased fishery output exceeded the benefits derived from grazing.

Considering the costs necessary to mitigate the effects of grazing, it would be difficult to justify not reducing the AUM's because of the resulting impacts and costs. In areas where impacts to the watershed occur due to grazing activities, thorough resource and economic analyses that consider the benefits and costs of the alternatives are needed.

Example 13: Title: Rangeland Renovation - Reduced Erosion and Increased Forage

Source: Rangeland Renovation, McKenzie, Grand River, and Ashland Ranger Districts, Custer National Forest, 1984.

Problem:

Runoff from some types of badland and prairie soils carries a large volume of sediment. In the past, small stock watering ponds served as catch basins for this sediment. This was a short term solution, however, because many of the ponds filled with sediment, were eventually overtopped, and washed out.

Areas of poor range condition and minimal ground cover produce excessive sediment. Many of soils in this example have a thin but very dense claypan and a salty surface horizon. This greatly reduces infiltration of precipitation and soil moisture available for plant growth. Thus, vegetation growth is reduced to near zero and vegetative cover is spotty.

Any solution to this problem needs to increase infiltration, available soil moisture, and vegetative cover, while reducing runoff and sediment yields.

Soil and Water Involvement:

Some areas can benefit substantially from conversion from weed species to native prairie grasses. Other areas have soil limitations which reduce or preclude growth of vegetation. These soils occur on the "thin, claypan range site" as described in northern plains terminology. For sites like these, a soil scientist can map soils, make soil interpretations to evaluate the suitability of various rehabilitation treatments, and recommend suitable vegetative cover species.

Approaches to Solution:

Breaking up the claypan layer and reducing salt concentrations in the surface creates soil conditions favorable for plant growth. Claypan prevents percolation of salts down through the soil profile, and concentrates salts at the soil surface.

Note that Agriculture Research Service (ARS) research found that salts are leached downward after the claypan is ripped, and that private landowners adjacent to these areas have succeeded in raising crops after ripping or plowing these thin claypan soils.

Rationale:

The claypan soils have a thin silty surface horizon (approximately 4 inches thick) with excessive salt concentration. Salts remain near the surface because the thin, impermeable clay layer immediately below prevents them from leaching through the soil profile.

Ripping, furrowing, or otherwise mixing the two layers (approximately 8 to 12 inches deep) increases infiltration rates, percolation rates, and rooting depth. Past projects increased forage production by an average of 1,200 pounds per acre, and as high as 1,600 pounds per acre. The desirable (palatable) portion of the vegetation can be increased along with range condition rating.

Agriculture Research Service data indicates sustained benefit from fertilizing after furrowing. On a thin claypan soil near Ekalaka, Montana, nitrogen fertilizer increased forage growth 310 percent compared to the same fertilizer used on a nonfurrowed site. The benefit of a single application on the furrowed site was still very evident when the study ended eight years later.

Table 13. Costs and benefits of rangeland rehabilitation project.

Project costs		project benefits	
Treatments			
-126 acres with diversions			
- 12 acres ripped			
- 15 gullies treated			
total costs:	$2,020		
		Forage Response	
		after treatment	1,600 lbs/acre
		before treatment	- 400 lbs/acre
		Increased forage	1,200 lbs/acre
		Animal Unit Months (AUM's)	
		before treatment	
		after treatment	
		Sediment	
		before treatment	0.2 tons/acre
		after treatment	-0.1 tons/acre
		reduced sediment	0.1 tons/acre
		Reservoir life	
		after treatment	80 years
		before treatment	-40 years
		increased life	40 years
		Wildlife forage	
		after treatment	800 lbs/acre
		before treatment	-200 lbs/acre
		increased forage	600 lbs/acre

Internal rate of return: 5.9 percent.
Present net value (at 4 percent): $2,146.
Benefit/cost ratio (at 4 percent): 2.06 to 1.00.

<u>Economics</u>: Since the early 1980's, several Custer National Forest Ranger Districts have done rangeland ripping along with some diversion ditching to reduce runoff flows and improve forage production. In 1984, the McKenzie Ranger District installed a combination of diversion ditches and rangeland ripping in an attempt to reduce runoff flows into a gullied area of a pasture. Table 13 displays the results of this effort.

Construction of small reservoirs will average $20,000. Increased vegetative cover and improved infiltrations rates will reduce sediment yields and prolong the life of these reservoirs by 40 years. The average life of the reservoirs was 40 years before treatment, thus $20,000 is saved forty years in the future. It is estimated that treatment will be required every 40 years to maintain benefits.

<u>Conclusions</u>:

The added benefit is that heavier forage cover and good infiltration will reduce runoff and the resulting sediment, while providing added cover and forage for wildlife.

The life expectancy of small reservoirs for livestock water is doubled from 40 years to 80 years. Doubling the life expectancy of these small reservoirs--which cost $20,000 to construct--thus reduces by half the total cost for the entire 80 year period. The treatment also improves the storage life of large reservoirs along the Missouri River.

Example 14: Title: **Chaparral Conversion In Arizona--Water Yield Response and Effects on Other Resources.**

Source: USDA-Forest Service, Rocky Mountain Forest and Range Experiment Station, Research Papers 126 and 127, Brown, Thomas C., Alden R. Hibbert, et.al. 1974, updated to 1987 values (through the CPI) with reference to related land use information and forest planning by Edward R. Frandsen, 1987.

Problem:

As the population of Central Arizona increases, demand for water, outdoor recreation, hunting opportunities, and other woodland products and services also increase. Efforts to meet these demands raise the question: "What product mix should National Forest lands in the Salt Verde Basin" emphasize; is this management emphasis socially and economically acceptable, and is the management decision in 1974 compatible with current forest planning?"

Soil and Water Involvement:

To identify areas favorable for treatment (chaparral conversion to grass for reduction of fire hazard, and increases in water yield and forage for livestock grazing, hydrologic surveys were conducted by Forest Service hydrologists, soil scientists, and others. These surveys included in-depth inventories of vegetation and soils, and were combined with topographic, recreation, and other National Forest information.

Forest Service watershed specialists delineated 139 separate chaparral areas; estimated costs of brush conversion; and determined the effects of conversion on yields of water, forage, and sediment. Effects on fire fire hazard, recreation use, aesthetics and visual resources, and wildlife habitat and hunting impacts were also determined.

Solution:

Chaparral control methods that have proven effective for Arizona are:

1) root plowing;
2) prescribed burning;
3) herbicides, and
4) chemical treatment (herbicides) in combination with the other three treatment methods.

Due to steep slopes (more than 20 percent) and often rocky and gullied land, only 2 to 8 percent of the chaparral area delineated was suitable for mechanical methods of control (Hibbert et al. 1974.) Establishing grass by sowing seeds directly into the ashes after burning (as opposed to establishing grass on areas of dead brush) also was considered.

Rationale: Decision and support rationale:

Inventory revealed 139 chaparral areas, totaling 332,796 acres, would meet crown cover, slope, and management criteria for conversion.

Water runoff: increases in runoff from chaparral brush converted lands were estimated from streams leaving the watershed; water supply to downstream hydroelectric dams; agricultural, municipal and industrial water use at final points in the Phoenix Valley; and increased water sources for wildlife and livestock.

Forage increases: forage increases for livestock and wildlife were created.

Where allotments were not overstocked, forage increases for livestock grazing were converted to pounds of beef, through increases in allotment carrying capacity. The value of increases in grazing capacity (with and without brush conversion) was estimated through expected net returns from cattle sales.

Fire cost savings: Conversion from brush-to-grass generally made it less costly to control fires.

Following brush conversion, a 20 percent reduction in fire starts was observed.

Fire benefits (in 1972 dollars) ranged from 3 cents to $2 per acre. Fire cost savings from the original analysis were updated to 1987 values using the Consumer Price Index (CPI). Updated fire cost savings (benefits) range from 8 cents to $5.44 per acre.

Recreation: Increases in hunting opportunities through improved vehicle access were determined for 3 of the 129 areas converted. These three areas were close to Phoenix, and helped meet some of the demand for outdoor recreation from this dense population center.

The following wildlife habitat improvements occurred:

the movement of animals improved; the abundance and quality of browse was augmented; and the variety of food increased.

Economics:

Benefit/cost analysis of chaparral brush conversion was performed on National Forest lands in the Salt-Verde Basin of Arizona. The costs of converting chaparral brush areas to grass and maintaining the conversion over a 50-year period was compared with the benefits to society.

Economic efficiency (positive benefits to costs) was not the only decision criterion, but it was a major factor in deciding whether to invest in the brush conversion project.

Undiscounted total costs (1972 dollars) were $6.5 million dollars. Updated to 1987 values, through the Consumer Price Index (CPI), estimated costs of conversion would be $17.7 million dollars.

Benefit/Cost analysis shows that alternative 1 (a treatment using an initial burn followed by maintenance burns and use of herbicide sprays) is economically feasible on 96 of the 139 areas.

This represents 82 percent (273,383 acres) of the total acres delineated; and 83 percent (147,118 acres) of the actual conversion acres.

Alternative 2 involves an initial herbicide treatment (soil-applied) treatment followed by maintenance burns. Table 14 shows total costs of conversion (benefits and costs.) For alternative 2, 72 of the 139 areas were economically feasible.

Table 14. Total benefits of conversion[1] of all areas with benefit/cost ratio[2] greater than 1.0:1, Salt-Verde Basin, Arizona

	Alt. 1 (best estimate)	Alt. 1 (low estimate)[3]	Alt. 2
Average Present Value (PV) Benefits			
Water			
Increase in off-site[4]			
Runoff (acre-feet)	30,443	24,010	27,281
Value to agric. ($)	340,960	268,907	305,551
Value to power ($)	43,494	36,721	41,766
Total water value ($)	384,454	305,628	347,317
Forage			
Increase in grazing capacity (in Animal Unit Months (AUM))	35,520	5,883	25,608
Value ($)	265,710	26,146	189,076
Fire			
Value ($)	90,289	35,082	76,775
Annual benefits ($)	661,182	346,503	552,660
Annual costs ($)	291,835	202,238	352,660
Annual PNV Benefits ($)	369,347	144,265	199,687

[1]Changes due to conversion, measured by the "with" minus the "without" technique.

[2]Constant 1972 dollars over 50-year planning horizon discounted at 6-7/8 percent. Analysis performed in 1972 using Water Resource Council prescribed discount rate of 6-7/8 percent.

[3]Alternative 1 reduced by using low estimates of yields of water runoff, forage production and utilization, and fire benefits.

[4]Eighty percent of the estimated on-site runoff increase.

[5]Annual benefits and costs are equal to PV [i(1+i)t / ((1+i)t - 1)].

Annual economic benefits, updated to 1987 values through the CPI, for each of the alternatives were:

alternative 1 (best estimate) $1,798,415; (low estimate) $942,488; and

alternative 2, $1,503,235.

Annual costs, updated to 1987, were:

alternative 1 (best estimate) $793,791, (low estimate) $550,087; and

alternative 2, $959,235.

Net annual benefits, by alternative, were:

alternative 1 (best estimate) $1,004,623, (low estimate) $392,400; and

alternative 2, $543,148.

Annual average costs and benefits per acre of converted chaparral brushland area also were updated to 1987 values. Updated average costs per acre by alternative are:

alternative 1 (best estimate), $5.39, and (low estimate) $5.30; and

alternative 2 average cost per acre converted was $9.00.

Net returns per acre converted, by alternative, are: alternative 1 (best estimate) $6.83, (low estimate) $3.78; and alternative 2, $5.09.

Conclusions:

Although water yield improvement practices are probably limited to less than one percent of the forest and rangeland area, there is a significant future in forest and rangeland management for these activities. Where economically feasible and environmentally acceptable, the production of extra water may well be one of the most appropriate objectives of land management (Hibbert 1983).

On areas favorable for treatment, converting brush to grass reduces fire hazard, and substantially increases water yield and forage for livestock and wildlife. Where treatment areas are kept small, properly designed and interspersed with brush areas, the edge effect created by the openings will enhance the wildlife habitat.

Had the chaparral conversion not been done, the economic benefits foregone would represent the opportunity costs.

Determining the feasibility of converting chaparral brush areas requires integrated interdisciplinary input, and sound hydrologic, soils, and vegetation data. This information was provided by Forest Service earth scientists, range scientists, and wildlife biologists.

References:

Hibbert, Alden R, Edwin A. Davis and David G. Scholl, Chaparral Conversion Potential In Arizona, Part I: Water Yield Response and Effects, USDA-Forest Service, Research Paper RM-126, July 1974.

Brown, Thomas C; Paul F. O'Connell and Alden R. Hibbert, Chaparral Conversion Potential in Arizona, Part II: An Economic Analysis, USDA-Forest Service, Research Paper RM-127, August 1974.

Example 15: Title: Bernalillo Watershed Flood Project

Source: Pilot Watershed Project Report, Soil Conservation Service/Forest Service, Albuquerque, New Mexico, 1958. Cibola National Forest, Region 3.

Problem:

The town of Bernalillo, New Mexico developed into an urban community with surrounding farming areas. No provisions were made for the passage of flood runoff into the Rio Grande. Runoff from summer floods periodically (once every 1 to 3 years) overtopped bridges, covered highways, flooded streets, damaged residences, and clogged irrigation works with sediment.

Soil and Water Involvement:

Soil and watershed scientists from the Soil Conservation Service (SCS) and Forest Service evaluated and implemented watershed practices that proved effective in eliminating flood damages suffered by the community.

Approaches to Solution:

The Soil Conservation Service proposed a flood water retarding structure. The Forest Service proposed watershed terraces on flat land and steep (up to 60 percent) slopes; contour furrows (pitting and chiseling); revegetation of woody pinyon-juniper and grasses; rock gully structures; and fencing to control grazing.

Rationale:

Costs were actual costs incurred for the project.

Benefits of flood damage reduction were based on past flood damages. The benefits were derived from reduced flooding and sedimentation and were estimated using the following process (see SCS Handbook, 1964):

Step 1: a flood discharge versus frequency graph was constructed.

Step 2: a discharge versus damage graph was constructed.

Step 3: a discharge versus damage graph was constructed, using results from Steps 1 and 2.

Step 4: the graph in Step 3 was graphically integrated to arrive at an annualized benefit value.

Other pertinent information:

All costs were incurred evenly over the first 5 years of the project. Effectiveness of watershed measures is based on past performance of similar practices used in the southwest and intermountain Regions.

Range depletion and deterioration produced the flood water and sediment problems of the developed irrigated valley. Range conditions were predominately poor, with only a few areas of fair and good condition.

The flood retarding structure is designed to regulate the maximum flow expected from a storm which might occur not more than once in 100 years on the average. The structure can operate for 50 years unimpaired before sediment accumulation encroaches on detention capacity.

Since virtually none of the flood waters flow into the Rio Grande, sediment from the watershed contributes only slightly to sedimentation of downstream reservoirs.

Annual conservation benefit is estimated at $3,460. Of this, $2,050 is the value of increased forage production, and $1,410 is the value of increased crop production.

Table 15. Distribution of costs and benefits by measures and groups of measures, Sandia Mountain Tributaries, Bernalillo Watershed (1987 dollars).

	Total cost spread evenly over first 5 years.	Average annual costs (at 4%).	Average Annual Benefit		
			Flood water & sediment benefit	Conser-vation benefit	Total annual benefits
(Dollars)	(Dollars)	(Dollars)	(Dollars)	(Dollars)	
Flood water retardation structure (Piedra Lisa Wash)	333,480	13,820	21,590	--	21,590
Stabilization and sediment control measures	14,580	605	945	315	1,280
Stabilization of critical areas	178,800	7,410	9,930	2,285	12,215
Contour furrowing-range seeding	160,910	6,670	6,895	11,030	17,930
All measures	687,770	28,505	39,360	13,630	53,015

Estimated life of project: 50 years. Costs occur beginning of each year, benefits occur end of each year.
Internal rate of return = 8.95 percent
Present net value (at 4 percent) = $502,017
Benefit/cost ratio (at 4 percent) = 1.79 to 1.00

<u>Economics</u>: Table 15 shows the costs and benefits derived from the watershed measures. Benefits to wildlife, range, or other resources not directly attributable to the objectives of this project were not valued. The costs and benefits are in 1987 dollars. These values are amortized over a 50 year period at a 4 percent discount rate.

<u>Conclusions</u>:

Installation of flood retarding measures can be cost effective as shown in this example. Simple measures such as stabilization and seeding of upland watersheds are as cost effective as more traditional measures such as flood water dams and retention basins.

<u>References</u>:

USDA Soil Conservation Service, 1964. Economic Guide for Watershed Protection and Flood Prevention. Chapter 3. Washington, D.C.

USDA, 1958. Sandia Mountains Tributaries of the Rio Grande Watershed. Albuquerque, New Mexico.

Example 16: Title: Recouping Timber Growth and Yield Losses Through Skid Trail Rehabilitation.

Source: George E. Dissmeyer and Bennett Foster, Soil Water and Air and Cooperative Forestry, Southern Region, Atlanta, Georgia

Problem:

Timber yields from trees growing in primary skid trails and skid roads is severely reduced. Soils within skid trails are severely compacted limiting soil moisture availability and root development. Soil nutrients are removed during skidding and in the construction of skid roads.

Soil and Water Involvement:

Soil and water specialists prescribe rehabilitation treatments for skid trails and skid roads.

Solution:

Install rehabilitation treatments. Rehabilitation treatments usually include soil ripping or tillage, waterbarring, seeding, fertilizing, and mulching where needed.

Rationale:

Wert and Thomas (1981) found volume growth of 42-year old Douglas-fir (*Psuedosuga menziesii*) in primary skid trails was reduced by 74 percent, compared to trees growing in undisturbed soil. Hatchell (1970) found loblolly pine (*Pinus taeda*) seedling establishment and early growth in primary skid trails were adversely affected by compaction. He suggested disking or subsoiling to break up the compaction and improve seedling establishment and early growth.

Hatchell (1981) reports tilling and fertilizing heavily compacted skid trails and landings resulted in seedling growth (through age four) as being close to growth occurring on undisturbed soils. Based upon verbal communication, 12-year height growth for trees growing in the skid trails is essentially as for those growing in undisturbed soil.

Dissmeyer (1985) presents the following basic concept for soil productivity:

> "Growth differences observed during the first 5 to 10 years of stand development on upland sites will persist through a pulpwood rotation and likely to a sawlog rotation. Thus, if loblolly growth with rehabilitated skid trails is essentially the same as those growing on undisturbed soil, then heights at the end of a sawlog rotation should be approximately the same."

Economics: The economics of primary skid trail and landing rehabilitation can be approximated using the data by Wert and Thomas (1981). Benefits from skid trail rehabilitation for hardwood, hardwood/pine, and shortleaf pine on site index 60 and 70 (base 50 years) land is estimated (table 16).

Evaluated sawlog rotations of 60 to 70 years were used. Table 16 shows the expected volume of timber per hectare and the value per cubic meter.

A growth loss of 74 percent (Wert and Thomas 1981) was used to predict growth of timber on skid trails. Empirical field observations suggest similar growth losses in Southern forests. The predictions showed 26 percent of timber volume on skid trails, compared to undisturbed soil. Growth losses on skid trails ranged between 233 and 311 cubic meters per hectare (3,184 to 4,440 cubic feet per acre) for the rotation.

Hatchell (1981) stated that long term growth could not be projected from his 4-year study on the effects of compaction, but the data summarized by Dissmeyer (1985) and Amateis and Burkhart (1985) on early (5-10 years) showed that height differences between site preparation treatments on upland Coastal Plain and Piedmont sites persist to the end of pulpwood rotations.

The growth curves presented by Dissmeyer (1985) and Amateis and Burkhart (1985) suggest that growth differences would probably also persist through 60-to 70-year sawlog rotations.

Table 16. Analysis of economic benefits of skid trail rehabilitation in the management of three southern timber types.

		Timber type		
	Units	Hardwood	Hardwood pine	Shortleaf pine
Rotation	Years	70	60	60
Harvest volume per hectare	Cubic M	301	350	420
Value per cubic meter	1986 $	$28.57	$42.86	$64.29
Total value of timber per hectare for uncompacted soil	1986 $	$8,600	$15,000	$27,000
Timber volume per hectare on skid trails (26% of uncompacted soil)	Cubic M	78	91	109
Timber volume lost per hectare	Cubic M	223	259	311
Cost per hectare of skid trail rehabilitation[1]	1986 $	$900	$900	$900
Timber volume recovered (75% of loss)	Cubic M	167	194	233
Value of timber volume recovered	1986 $	$4,771	$8,315	$14,980
Internal rate of return	percent	2.4	3.8	4.8
Present net value (at 4 percent)	1986 dollars	-$592	-$110	$524
Benefit/cost ratio (at 4 percent)		0.34:1	0.88:1	1.58:1

[1] Average cost per hectare of skid trail for waterbarring, ripping or disking, seeding, fertilizing, and mulching where needed.

Hatchell (1981) found that 4-year heights were the same between rehabilitated skid trails and uncompacted soil. Twelve year heights were essentially the same (McKee, verbal communication). Projecting to the end of a pulpwood rotation, the trees in the former skid trails should be about the same as trees growing on the uncompacted soil. Tree height should also be approximately the same at the end of a sawlog rotation.

For the purposes of this example, is was estimated that only 75 percent of the growth loss would be regained by skid trail rehabilitation.

The average cost to fully treat a hectare of skid trail is $900 ($354 per acre).

Full treatment includes waterbarring, ripping or disking, seeding, fertilizing and mulching where needed. Using a 4 percent discount rate, the present net values of rehabilitating three timber types range from minus $594 to $524 per hectare (-$234 to $206 per acre).

The benefit/cost ratio for hardwood is 0.34; for hardwood pine 0.88; and for shortleaf pine 1.58. The rates of return range from 2.4 to 4.8 percent.

<u>Conclusions</u>:

> Investments in skid trail rehabilitation in moderately high-value shortleaf pine contributes significantly to timber production and a financial sound investment.
>
> In relatively low-value hardwood and hardwood/pine timber types, skid trail rehabilitation will not produce a positive financial return (using a 4 percent discount rate). Using a lower discount rate (2 percent) would yield a positive economic return. Skid trail rehabilitation will be even more productive in more highly-valued timber types.

<u>References</u>

Ameteis, R. L. and H. E. Burnhart. 1985. Site index curves for loblolly pine plantations on cutover site-prepared lands. Sou. Jour. Applied For. 9:166-169.

Dissmeyer, G. E. 1985. Economic impacts of erosion control in forests. In. Proceedings Southern Forestry Symp. Nat. Assoc. of Prof. Forestry Schools and Colleges. November 19-21, 1985, Atlanta, Ga. (In Press).

Hatchell, G. E., C. W. Ralston, and R. R. Foil. 1970. Soil disturbances in logging: Effects on soil characteristics and growth of loblolly pine in the Atlantic Coastal Plain. J. For. 68:772-775.

Hatchell, G. E. 1981. Site preparation and fertilizer increase pine growth on soils compacted in logging. Sou. Jour. Applied For. 5:79-83.

Wert, S., and B. R. Thomas. 1981. Effects of skid roads on diameter, height, and volume growth in Douglas-fir. Soil Sci. Soc. Am. J. 45:629-632.

APPLICATIONS

This project, from the beginning, was designed to present a series of examples demonstrating approaches that can and have been used for similar projects. Each contains information and demonstrate procedures that can be applied to similar situations.

Because the material is presented in this way, and because it contains an extensive bibliography, it provides a number of opportunities for practical application. For instance: using one or more of the procedures illustrated by this report, the economic costs and benefits of timber sale alternatives can be evaluated. The analysis may determine that the application of mitigation measures for watershed may in fact restore soil productivity and in turn result in sustained or increased growth for timber.

The examples come from all areas of the United States, and represent a good cross-section of resources and approaches. Many are based on work done by agencies, research, universities, and private landowners.

This effort brought together a large amount of economic information related to resource management and mitigation measures. This project may well serve as a prototype for developing resource management economics and for identifying research needs. As it proceeded, an amazing array of information was obtained. While not all of the information led to examples, it did provide a basis to determine future needs in research and studies.

This report will be useful in federal and state agency, industrial, university and private applications. The following lists some specific uses (or users) of the information and approaches presented:

- Resource Planning Act assessments;
- forest land management planning;
- environmental impact statements;
- state forest resource planning;
- industrial forest land planning;
- addressing national issues;
- training;
- universities;
- small landowners;
- Soil Conservation Service activities;
- Economic Research Service;
- international conservation activities;
- analysis of resource interactions;
- establishing budget priorities;
- communications with other resource specialists; and
- monitoring activities.

RESEARCH NEEDS

In constructing the examples of soil and water economics and in reviewing accumulated literature, it became clear that several types of data and resource interaction relationships are not currently available. Without these data and relationships it is not possible to quantitatively estimate induced outputs and benefits for these situations, though they are qualitatively recognizable.

Economic analysis or justification of resource management effort can proceed where the specific physical input/output interactions are known and quantified.

The following are a few specific research needs if more complete economic analyses or valuations are to be made:

1. development of fish/sediment relationship models for warm and cold water fisheries for all sections of the country;

2. research on "instream flow needs"--the relationship of stream flow regime to fisheries, wildlife, benthic organisms, recreation experience and values, aesthetics, and sustaining riparian resources;

3. research on riparian/wetland dependent resources and their dependence on soil and water resource management;

4. expansion of soil productivity research, including timber, range, and wildlife management interactions with soil properties and soil productivity for all sections of the country;

5. research on soil and watershed management associated with road construction and maintenance, and the cost/effectiveness of soil and water management associated with roads; and

6. research on the value of improved water yield and quality to downstream users of water.

CONCLUSIONS

Watershed management involves the basic resources of soil and water, upon which the production of all forest and range land products and services depend. The production of goods and services from these lands is a function of the manner in which the soil and water resources are managed, conserved, and used.

Watershed management is the process of formulating and carrying out courses of actions involving the manipulation of natural, vegetation, and human resources on a topographically delineated watershed. Watershed management considers social, economic, and institutional factors; changes in land use and vegetative cover; and nonstructural and structural actions taken to achieve watershed management objectives.

The interrelationships between soil and water and other related land resources are embedded in watershed management. Watershed management practices or projects illustrated by report examples, include:

1) rehabilitation practices aimed at correcting past land use actions;

2) protection practices to maintain, sustain, augment, or enhance current or future land uses; and

3) integration of watershed practices aimed at sustaining or enhancing upland productivity (while preventing adverse on-site or downstream impacts) into other resource development actions.

This report provides a workable framework discussing a set of economically feasible watershed practices/projects which have been applied on National Forest lands. Most of the examples presented demonstrate positive returns from investments in soil and water resource management.

A few examples evaluated practices that were not cost effective for a specific site and management situation. However, these practices applied in another setting may prove to be cost effective.

These examples may assist others in quantifying and evaluating the economics of water and related land resource practices and projects. Such analyses will aid in prioritizing projects or practices for funding to gain the greatest economic efficiency.

In the examples, incremental outputs and values of induced goods and services attributable to investments in management of soil and water resources on forest and range lands are identified. The examples provide insights into the economic implications and impacts of watershed management and other related land resource activities, practices, and projects.

APPENDIX A

MATRICES USED IN LITERATURE SEARCH AND AS FRAMEWORKS FOR ECONOMIC ANALYSES

Five matrices were developed to estimate the economic benefits from soil and water resource management in the five emphasis areas (tables A-1 through A-5). These matrices served three functions:

1) directed the literature search;
2) governed the cataloguing of papers; and
3) projected the induced outputs and economic benefits from soil and water resource management.

The matrices were developed under the premise that it was very unlikely that the literature or file reports from agencies would have examples of economic analyses which quantified induced outputs from soil and water resource management. However, the literature does contain numerous papers that demonstrate the effect of different soil and water practices (for example on seedling height growth, or on pole and sawtimber growth).

The literature has height growth curves, growth and yield tables, growth and yield models, and other procedures that can be linked together to project timber yields at the end of the rotation. The same linkages can be developed for forage, fisheries, and water enhancement. (The road emphasis area, however, required a different approach.)

By linking several procedures together, we produced matrices to estimate outputs of timber, forage, fisheries, and enhanced water from specific soil and water practices. The matrices provide a framework for comparing differences in resource outputs between very poor, poor, good, and excellent soil and water resource management.

The difference in resource outputs between lower and better quality soil and water practice is claimed as an induced output for proper soil and water resource management. For the purposes of this project, soil and water resource management can claim the induced output as a benefit from its program only if investments were made in soil and water management as a part of the project.

Once the induced output from soil and water investments is estimated, an economic analysis is performed. The cost of providing soil and water input into the project is determined and compared with the value of the induced output. A benefit/cost ratio, a present net value, and an internal rate of return are computed for the soil and water practice.

The matrices focused the literature search and governed cataloguing of literature when it was received. The cells in the matrices identified the type of information, data, and relationships needed. The literature search sought out specific papers containing information identified for each cell. Once papers were found, they were identified with the cell(s) for which they contained information.

This literature search did not locate and catalogue all available papers for the five emphasis areas. The matrices are still useful for identifying missing

information, or information that would apply to a new situation within the five emphasis areas.

For developing economic examples, induced output was limited to the one primarily associated with the matrix used. For example only timber outputs were estimated in developing the examples with the timber matrix. Obviously, the soil and water related practices listed in the timber matrix affect water yields, water quality, fisheries, and enhanced water. These practices are listed in other matrices, and are evaluated there.

However, matrices can be linked together to evaluate an array of resource interactions, thus giving a more complete analysis of impacts, induced outputs and combined economic benefits within the five emphasis areas. Similar matrices can be developed for several of the other resource areas and linked with these for a more comprehensive analysis.

Timber matrix

The timber matrix requires specific data and relationships to estimate the induced timber output from soil and water management (table A-1). The literature search was limited to major types being managed in the various regions of the country: Douglas-fir, jack pine, loblolly pine, lodgepole pine, longleaf pine, maple, oaks, ponderosa pine, red pine, sand pine and slash pine.

A partial list of soil and water related timber management practices are displayed in column 1. These management practices reflect different soil and water treatments or impacts: soil tillage, soil compaction, soil exposure, nutrient management, and mitigation. For purpose of developing economic examples, soil and water related practices of logging systems, site preparation, fertilization, skid trail rehabilitation, and reforestation were chosen.

Stocking levels are influenced by soil and water practices (column 2). stocking levels from natural regeneration are often governed by the amount of soil exposure, tillage or scarification, soil compaction, and nutrient availability. Data on stocking levels as a result of different types of site preparation can be found in the literature, or better yet, in in-house stocking survey reports.

As the stand matures, mortality reduces the number of stems per acre. Given initial stocking levels for each soil and water related practice, future stocking levels can be estimated using mortality curves or survival over timber curves. It is then possible to determine the practices providing adequately stocked stands throughout the rotation (under normal conditions), and those practices that will not. Stocking differences between treatments can be estimated over time.

Soil and nutrient management affect seedling and sapling growth (column 3). The literature has numerous papers documenting the influence of these soil and water related practices on early growth. Papers reporting height growth differences at 5 to 10 years of age are preferred over reports for ages less than 5 years.

If literature is not available for the effects of different site preparation practices on seedling/sapling growth, this information can be gathered through field observations.

The procedure for collecting this data starts with locating plantations of similar age (in the 5- to 10-year age range) that have been established using a wide variety of site preparation treatments. All must be located on the same soil series.

Selected plantations should all be on sites receiving the same amount of precipitation; with the same aspect; and at the same elevation. This eliminates growth variations from differences in soil and site location. To be selected, plantations must be planted with the same nursery stock to eliminate growth differences due to varying genetic characteristics.

Table A-1. Timber matrix (species-specific)

(1) Soil & Water Related Practices	(2) Stock. level (%)	(3) S&S Gr. (Ft)	(4) P&S Gr. (Ft)	(5) Ht. Gr. Curve	(6) G&Y Tables Cu.Ft.	(7) Induced Output Cu.Ft.	(8) Economics (a) B	(b) C	(c) B/C	(d) IRR
Logging system										
Tractor	%	Ht.	Ht.	R	Ya					
Cable	%	Ht.	Ht.	R	Yb	Yb - Ya	$	$	B/C	%
High lead	%	Ht.	Ht.	R	Yc	Yc - Ya	$	$	B/C	%
Site preparation										
Shear & windrow	%	Ht.	Ht.	R	Yd					
Disking	%	Ht.	Ht.	R	Ye	Ye - Yd	$	$	B/C	%
Chop & burn	%	Ht.	Ht.	R	Yf	Yf - Yd	$	$	B/C	%
Herbicide	%	Ht.	Ht.	R	Yg	Yg _ Yd	$	$	B/C	%
Fertilization										
Unfertilized		Ht.	Ht. or DBH	R	Yh					
Fertilized		Ht.	Ht. or DBH	R	Yi	Yi - Yh	$	$	B/C	%
Skid trails										
No rehab.	%	Ht.	Ht.	R	Yj					
With rehab.	%	Ht.	Ht.	R	Yk	Yk - Yj	$	$	B/C	%
Species Selection										
Species "l"	%	Ht.	Ht.	R	Yl					
Species "m"	%	Ht.	Ht.	R	Ym	Ym - Yl	$	$	B/C	%

The next step is to measure and average tree heights for the different site prepared areas. Differences in average height between plantations can be attributed to differences in site preparation treatments.

Height growth curves and models are available to project height of saplings through to the end of the rotation (column 5). Early height growth differences between treatments can be translated into estimated height or site index differences at the end of the rotation.

Occasionally, height growth responses from site preparation have been tracked through 23 to 25 years or to pole size stands, and reported in the literature (column 4). These long term studies confirm growth curves and models (column 5). Again, height differences in pole stands can be projected to the end of the rotation using the growth curves and models (column 5).

Fertilization is used when a stand is established or after stand closure, depending upon the nutrient(s) applied and the purpose of the treatment.

On phosphorus-deficient soils, phosphorus applied when the trees are planted enhances growth from the seedling stage through the end of the rotation. is enhanced. Nitrogen is frequently applied after stand closure to enhance pole and sawtimber growth (column 4).

Once height growth differences are projected to the end of the rotation, growth and yield tables or models can be used to determine yields resulting from various soil and water treatments (column 6).

The timber yield differences between low quality and better soil and water practices are determined. This is the increment of induced output due to improved soil and water management (column 7).

For site preparation, if treatment "D" produced the highest yield (YD), the induced output over treatment "E" is "YD" minus "YE" (column 7).

In some cases, both timber and watershed make investments into a project that results in enhanced timber growth. Sometimes it is not possible to estimate what proportion of the induced output is attributable to which investment.

An example is fertilization. Soil scientists make soil interpretations stating that a soil needs to be fertilized, and recommend the rate of fertilizer application. Timber pays for the fertilizer and for the application. Both watershed and timber made significant investments in the project, and each have claim to a portion of the benefits. It is not possible to divide the benefits between the two, thus a joint benefit/cost analysis is made.

The increment of induced timber output has monetary value depending upon the species and products. The value or benefit is expressed as present value in dollars per acre (column 8a). The costs associated with soil and water management are converted to present cost per acre of the project (column 8b). A benefit/cost ratio is computed (column 8c). Finally, an internal rate of return on the investment is calculated (column 8d).

Forage Matrix

The forage matrix links information, data, and relationships together to estimate the induced outputs (browse and forage) and economic benefits. The resource being managed is forage which can be consumed by a variety of wildlife and domestic livestock. Economic benefits from induced forage yields from soil and water management can be estimated by translating these yields into carrying capacity.

The literature search sought specific types of information, data, and relationships for each cell in the model (table A-2). Column 1 lists several soil and water related practices that affect forage production or utilization. Literature reporting forage yields for these practices is reported in column 2.

Information on the conversion of pounds of forage to carrying capacity for various animals is in column 3. The value of each type of animal is also needed for the matrix.

The forage model estimates benefits from soil and water management in the following fashion:

For range rehabilitation of a specific vegetation type, potential treatments are identified (column 1).

In searching for literature and developing examples for this effort, only range rehabilitation, water development, and grazing system practices were considered. The literature and forest reports used contain information on the pounds of forage associated with the different types of range rehabilitation practices and grazing systems (column 2).

Forage production associated with untreated conditions is compared with that produced by a rehabilitation practice. The difference between the treated and untreated forage yields is the increment induced by the treatment (column 3).

Table A-2. Range matrix (by range type)

(1) Soil and water related practice	(2) Forage yield (lb.)	(3) Induced resource output (lb.)	(4) Conver. factor to AUMs	(5) Increment of AUMs	(6) Economics (a) B	(b) C	(c) B/C	(d) IRR
Range Rehab.								
Untreated	Ya							
Erosion control	Yb	Yb - Ya	R	#	$	$	B/C	%
Brush control	Yc	Yc - Ya	R	#	$	$	B/C	%
Gully control	Yd	Yd _ Ya	R	#	$	$	B/C	%
Type conversion	Ye	Ye - Ya	R	#	$	$	B/C	%
Grass seeding	Yf	Yf - Ya	R	#	$	$	B/C	%
Water Development								
W/o water development	Yg							
With water development	Yh	Yh - Yg	R	#	$	$	B/C	%
Grazing System								
System "i"	Yi							
System "j"	Yj	Yj - Yi	R	#	$	$	B/C	%

The increment of induced forage yield needs to be converted into numbers of animals. Conversion factors to translate pounds of induced forage yield into numbers of animals are recorded in column 4.

Forage is consumed by a variety of animals. Thus the model can be used to evaluate soil and water treatments on both domestic and wild animals. The increment of forage is translated into carrying capacity, measured in animal unit months (AUM's) of forage (column 5).

Different animals have different economic value. The value per AUM is multiplied by the increment of AUM's to derive the economic benefit (column 6a).

The cost of providing the soil and water input into the project is recorded in column 6b.

A benefit/cost ratio is computed (column 6c). The internal rate of return is shown in column 6d.

A word about conversion factors: they vary widely. They can vary between vegetative types and localities. Even within a type and location, different scientists have different opinions as to the proper conversion factor. Get a consensus for a representative conversion factor, or use an average of the factors available.

Water developments requires a different approach. Water distribution is a key factor for livestock distribution and forage utilization. Livestock limit the distance from water they travel while foraging. Forage utilization is concentrated near water. Parts of the range may be underutilized and parts may be over utilized because of limited sources of water.

Animals can be made to forage more uniformly over the range by constructing water developments in under utilized areas. This makes more forage readily available, so more animals can use the area.

Forage consumption "with water development" is compared with that for "without water development". In column 2, pounds of forage utilized (for both conditions) is recorded. The difference between the two conditions (with and without water development) is the amount of forage that can be attributed to the water development (column 3).

The conversion factor (column 4) translates this increment of increased forage consumption into AUM's. The increment of AUM's is converted to dollar benefit (column 6a) and is compared to the cost of the water developments.

A benefit/cost ratio and an internal rate of return can be computed (columns 6c and 6d).

Fish Matrix

The fish matrix (table A-3) translates soil and water related practices into water quality and water yield impacts (column 2).

Models and relationships translate water quality and water yield characteristics into fish emergence, carrying capacity, and/or biomass (column 3).

Different soil and water related practices produced different water quality. For example, under harvesting systems, tractor logging involves skid trails, landings and roads, all sources of sediment. With proper location, construction, and closure of skid trails, landings and roads, sediment concentrations and bedload in the stream can be greatly reduced. Sediment adversely affects emergence, carrying capacity, and biomass for cold water fish.

The fish response to tractor logging with mitigation measures is estimated using models or relationships and is recorded in column 4, as is the fisheries response for tractor logging without mitigation measures.

The increment of fish produced due to implementation of soil and water measures (the difference between fisheries responses with and without mitigation--see column 4) is recorded in column 5.

There are two ways to establish value figures for the fisheries resource.

One is to convert the increment of fish into Wildlife-Fish User Days (WFUDs). A conversion factor (to convert numbers of fish to WFDs) is needed. If a conversion factor is available, multiply the increment of fish by the factor and record the WFUDs in column 6.

A WFUD has an economic value. WFUD values have been established for several areas of the country. Multiply the number of WFUDs by the WFUD value to estimate the benefit (column 7a).

The cost of soil and water input into the project and the cost of mitigation measures is summed and reported in column 7b.

A benefit/cost ratio and the internal rate of return is computed (columns 7c and 7d).

More information and data is needed to support the cells in the model. The fish model will rely on some of the fish habitat relationships models that have become available in the past few years.

Table A-3. Fish matrix (species-specific).

(1) Soil and water related practices	(2) WY, WQ, T	(3) Emerg. CC & Biomass	(4) Number or lbs. of fish	(5) Induced Output of fish	(6) Conv. fish/ WFUDs	(7) Economics (a) B	(b) C	(c) B/C	(d) IRR
Instream flow needs									
Managed	WY,WQ,T	R	Ya						
Unmanaged	WY,WQ,T	R	Yb	Ya - Yb	WFUDs	$	$	B/C	%
Road									
Location									
Good	WQ	R	Yc						
Poor	WQ	R	Yd	Yc - Yd	WFUDs	$	$	B/C	%
Construction									
Good	WQ	R	Ye						
Poor	Barriers to migration	R	Yf	Ye - Yd	WFUDs	$	$	B/C	%
Harvesting syst.									
Tractor	WY, WQ	R	Yg						
Cable	Lg. organic	R	Yh	Yh - Yg	WFUDs	$	$	B/C	%
High lead	debris	R	Yi	Yi - Yg	WFUDs	$	$	B/C	%
Shade strips	Shade	R	Yj	Yj - Yg	WFUDs	$	$	B/C	%
	Detritus Sediment								
Site preparation	(Same approach)								
Range Management	(Same approach)								

Enhanced Water Matrix

The enhanced water matrix evaluates soil and water practices in terms of downstream users of water, for example to municipal water supplies and for irrigation.

A few soil and water related practices are listed in column 1 (table A-4): logging systems, roads and recreation. Other practices can be listed, but for the purposes of this effort, these were the examples chosen.

These practices affect water quality and water yield (see column 2). Different soil and water practices produce different concentrations of nutrients, sediment and organic matter, and different stream temperatures.

Roads also add salt and oils in runoff. Recreation activities can increase fecal coliform levels in water. If water is impacted by these activities, the cost of water treatment for domestic water supply companies is affected.

Table A-4. Enhanced water matrix.

(1) Soil and water related practices	(2) Water quality, yield & timing.	(3) Convers. factors	(4) Treatment cost or value	(5) Increm. treatment savings or value.	(6) Economics (a) B	(b) C	(c) B/C	(d) IRR
Logging systems								
Tractor	WY,WQ,T	Down-	$i					
Cable	"	stream	$ii	$i - $ii	$	$	B/C	%
High lead	"	value =	$iii	$i _ $iii	$	$	B/C	%
		f(WY). Treat- ment cost = f(WQ).						
Roads								
Location	"	"	$iv					
Construction	"	"	$v	$iv - $v	$	$	B/C	%
Recreation								
Swimming	WQ	"	$vi					
Fishing	"	"	$vii	$vi - $vii	$	$	B/C	%

Water treatment costs increase as the concentration of a pollutant increases (column 3). With the new EPA regulations, if concentrations increase above a threshold, full treatment is required. Thus, water treatment cost can take a quantum leap. Relationships of treatment costs as a function of pollutant concentration are needed (column 3).

Under logging systems, tractor logging may yield more sediment than a cable system. The sediment yield from tractor logging will cost $i to treat (column 4). The cost to treat the sediment from cable logging is $ii(column 4).

If cost $ii is less than cost $i, a treatment cost savings ($i - $ii) is reported in column 5.

Treatment cost savings are converted to present value and reported as the benefit (column 6a).

Costs of planning and implementing sediment control measures are reported as current costs in column 6b.

A benefit/cost ratio and an internal rate of return are computed (columns 6c and 6d).

The way timber is harvested can affect water yield (column 2). If water yield is increased and the resulting water results in more households being served, in more agricultural land brought into production, or in more crop yield per acre, the increased water yield has value. Conversion relationships or factors to convert water yield into downstream value are needed (column 3).

The downstream value of water yield from various harvesting systems is recorded in column 4.

The increment of increased downstream value is reported in column 5.

The downstream value is converted to present value or economic benefit (column 6a). The cost of designing and implementing the harvesting system to increase water yields is recorded in column 6b.

The benefit/cost ratio and an internal rate of return are computed (columns 6c and 6d).

Road Matrix

The road matrix is fairly straight forward (table A-5). In column 1, several soil and water related road practices are listed: location, drainage, culvert sizing, revegetation of cut and fill slopes, and road surfacing.

The cost of construction with and without the soil and water measures are recorded in column 2.

Often soil and water measures influence maintenance costs. The maintenance costs for with and without watershed treatments are reported in column 3.

Sometimes watershed measures lower construction costs and the increment of construction cost saved is recorded in column 4. In some cases, soil and water practices may increase construction costs. The increment of increased cost is then reported in column 4.

Watershed related practices can reduce or increase maintenance costs and the increment of reduced or increased costs in reported in column 5.

Table A-5 Road matrix

(1) Soil and water related practices	(2) Construction cost	(3) Maintenance cost	(4) Cost Savings	(5) Economics (a) B	(b) C	(c) B/C	(d) IRR
<u>Location</u>							
Good	$g	$g					
Poor	$p	$p	$g - $p	$	$	B/C	%
<u>Construction</u>							
Good	$g	$g					
Poor	$p	$p	$g - $p	$	$	B/C	%
<u>Drainage</u>							
Good	$g	$p	$g - $p	$	$	B/C	%
Poor	$g	$p	$g - $p	$	$	B/C	%
<u>Culvert Sizing</u>							
Proper size	$ps	$ps					
Too small	$sm	$sm	$ps - $sm	$	$	B/C	%
<u>Revegetate Cut & Fill Slopes</u>							
Seed & mulch	$m	$m	$u - $m	$	$	B/C	%
Seed, mulch & fert.	$f	$f	$u - $f	$	$	B/C	%
Hydroseed	$h	$h	$u - $h	$	$	B/C	%
Untreated	$u	$u					
<u>Road Surfacing</u>							
Surfaced	$$s	$$s	$$s - $$u	$	$	B/C	%
Unsurfaced	$$u	$$u					

In making the economic analysis, if construction and maintenance costs are reduced, these savings are treated as benefits. If these costs are increased, then they are treated as a cost.

The increments of construction and maintenance costs savings are adjusted to present value, summed and reported as the benefit in column 6a.

The cost of providing soil and water input to the project plus the increment of increased cost for installing and maintaining the practice(s) are converted to current cost, summed, and reported in column 6b.

A benefit/cost ratio and an internal rate of return are computed (columns 6c and 6d).

Road surfacing can be analyzed in a different fashion. If soils exist that have enough natural rock and have other soils characteristics to permit road traffic without surfacing, soil and water input can save in surfacing costs.

Soils input consists of soil mapping and interpretation and water input consists of soil moisture/precipitation analysis to determine the amount of traffic the soil can handle ("trafficability"). The period of trafficability is determined for the setting and compared with the needed traffic period.

If the required traffic period is short enough, the road surface may not need to be surfaced. Thus the saving in surfacing costs is the benefit (column 6a).

The costs includes soil mapping, soil interpretations, and soil moisture, precipitation and soil trafficability analyses (column 6b). A benefit/cost ratio and internal rate of return is computed (columns 6c and 6d).

BIBLIOGRAPHY AND DATA GENERAL COMPUTER INTERACTION

The bibliography accompanying this report has been developed as a working tool. It can be used as a source for locating specific articles at the local library. (Refer to the Bibliography section for explanation of the printed Bibliography accompanying this report.) It can also be used by any person familiar with the CEO system on the Data General (DG) terminals of the USDA Forest Service. (Refer to the Data General Data Base and Interface with PRESENT section for further discussion of the data base which stores the bibliography.)

Bibliography

Over 700 pieces of literature were collected during the literature search. Each article was reviewed for content according to the matrices established (Appendix A). The bibliography which follows is a listing of these articles sorted according to the five emphasis areas: timber, forage, fisheries, enhanced water, and roads.

Many of the articles encompass information for more than one emphasis area. A paper such as "Cattle Grazing and Wood Production with Different Basal Areas of Ponderosa Pine" by Warren P. Clary reports both timber and forage production and, therefore, will be reported in the citations for TIMBER MATRIX - CITATIONS FOR PONDEROSA PINE as well as FORAGE MATRIX - CITATIONS FOR REGIONS 1, 2, 3, AND 4. Additionally, the five emphasis areas are further sorted into species types or geographic regions. The heading on each page of the bibliography indicates the matrix and species type or geographic region.

Each citation has been formated with the AUTHOR(S) and the DATE on the first line. The second line is the TITLE of the article. The SOURCE for the article is printed on the third line. The fourth line contains: the PAPER NUMBER assigned to each article, the soil and water related management PRACTICE, the RANGE TYPE , and the corresponding MATRIX COLUMNS relating to the specific emphasis area. (See Appendix A for an explanation of these individual columns.) To further clarify the citation, each of these parts will be dealt with individually.

AUTHOR(S) — Listed in alphabetical order. Each emphasis area and corresponding subheading is a new listing restarting the alphabetical order.

DATE — Date article was published.
Different articles but with the same author(s) are listed in ascending order according to the date of the publication.

TITLE — Due to space limitations of the data base some titles were either abbreviated or some joining words left out entirely. Some abbreviations were used (refer to abbreviations list).

SOURCE — Publication where article resides.
The source may be a formal journal, a U.S. government publication, a published conference proceedings, or an

unpublished report by an individual or agency.

U.S. Forest Service Experiment Stations are a common source for many of these articles and are usually cited: USFS RM-145 General Technical Report. This indicates that the citation is a U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report Number 145. The abbreviations listing will be a quick reference for all these types of papers.

PAPER NUMBER This is a reference number corresponding to each unique article. A library of all articles listed in the bibliography is maintained by________________________________. If a particular article cannot be located, a request of this office can be made. Refer to the paper number with the request.

PRACTICE Each article deals with a specific practice relating to soil and water resource management or impacts. The practice is listed in this column. However, some articles are general, or report multiple management practices. In such cases this column lists broader categories such as Multiple, General Watershed Management, General Paper, Economic Analysis, etc. Any unpublished reports from National Forest offices are listed as Forest Report in this column.

RANGE TYPE The Map of Forest and Range Ecosystems of the U.S.-1977 (Garrison et al. 1977. Vegetation and Environmental Features of Forest and Range Ecosystems. USDA Forest Service, Agriculture Handbook No. 475) is the classification system used to label range types. This column is not included for the timber emphasis area.

MATRIX COLUMNS These columns differ for each of the five emphasis areas. Appendix A deals specifically with the matrices used and gives a detailed explanation of each column.

An (X) has been used to indicate that the particular citation includes information relating to the specific column or contains sufficient data to develop the information needed for the column. A (~) or a blank space in the column indicate that no such information exists. The ECONOMICS column gives abbreviations for economic information reported in the article: B (Benefit), C (Cost), B/C % (Benefit-Cost Ratio), and IRR (Internal Rate of Return). Again, this information is directly reported or can be determined by the information provided in the article.

Due to space limitations many abbreviations were used in these matrix columns (refer to the Abbreviations List).

Abbreviations, Expansions and Definitions

These abbreviations are found in the citations or headings of the bibliography accompanying this report.

TITLE and SOURCE:

Abbreviations of State names follow the U. S. Postal Service system (e.g., CO for Colorado, IL for Illinois)

Federal Agencies:

FS	United States Forest Service
SCS	United States Soil Conservation Service
TVA	United States Tennessee Valley Authority
USDA	United States Department of Agriculture
USFS	United States Forest Service
USDI	United States Department of Interior
WO	Washington Office of the U. S. Forest Service

USDA Forest Service Experiment Stations:

INT	Intermountain Forest and Range Experiment Station
NC	North Central Forest Experiment Station
NE	Northeastern Forest Experiment Station
PNW	Pacific Northwest Forest and Range Experiment Station
PSW	Pacific Southwest Forest and Range Experiment Station
RM	Rocky Mountain Forest and Range Experiment Station
SE	Southeastern Forest Experiment Station
SO	Southern Forest Experiment Station
FPL	Forest Products Laboratory

USDA Forest Service Regions:

Region 1, Northern
Region 2, Rocky Mountain
Region 3, Southwestern
Region 4, Intermountain
Region 5, Pacific Southwest
Region 6, Pacific Northwest
Region 8, Southern
Region 9, Eastern
Region 10, Alaska

Other Abbreviations:

Conf (conference)
Proc (proceedings)
GTR (General Technical Report)
S (sulphur)
N (nitrogen)
FOR (forest or forestry)
RNG (range)

MATRIX COLUMNS:

Timber Citations:
- Seed Sap Growth (Seedling and Sapling Growth)
- Pole & Saw (Pole and Sawtimber Growth)
- Growth Curves (Height Growth Curves)
- G and Y Tables (Growth and Yield Tables)

Forage Citations:
- Pounds Forage (Pounds of Forage)
- Conversion to Number Animals (Conversion Factor to Number of Animals)
- Induced Number Animals (Induced Number of Animals)

Fisheries Citations:
- WQ WY WT FH (Water Quality, Water Yield, Water Timing, Fish Habitat: all of these are in column 2 of the matrix in Appendix A.)
- EM CC BM (Emergence, Carrying Capacity, Biomass Model: All of these make up column 3 of the matrix in Appendix A.)
- Numbers/Pounds (Numbers or Pounds of Fish)
- Increment (Induced Increment of Fish)
- Convert to WFUD (Conversion of Fish to WFUDs)

Enhanced Water Citations:
- WQ WY WT (Water Quality, Water Yield, Water Timing: All of these make up column 2 of the matrix in Appendix A.)
- Conversion Relations (Conversion Relationships)
- Cost or Value (Treatment Cost or Value of Water)
- Savings Increment (Increment of Treatment Savings or Water Value)

Road Model:
- Construction Cost (Construction Costs)
- Maintenance Cost (Maintenance Costs)
- Construct Increment (Construction Cost Increment)
- Mainten Increment (Maintenance Cost Increment)

STOP HERE IF YOU ARE ONLY INTERESTED IN THE FOLLOWING 'HARDCOPY' BIBLIOGRAPHY

CONTINUE FOR INFORMATION ON THE BIBLIOGRAPHY DATABASE, IMPORTING THE DATA BASE INTO YOUR OWN DG SYSTEM AND USING DG SOFTWARE FOR MANIPULATING THIS DATA

USDA Forest Service Data General Data Base and Interface with PRESENT

To facilitate the cataloguing process, each article was entered in a Data Table using the DG software, CEO Decision Base Data Table Processor. To sort and develop the printed copies which form the accompanying bibliography of this report, PRESENT Information Presentation Facility, a software package available on the DG, was used.

This Data Table has been stored so that a copy of it can be retrieved by any person wishing to do her/his own sorting using PRESENT or other report formatting software available with the DG system. The process for this will be explained in detail in the Retrieval and Import sections.

Bibliography Storage in Data Table

The Data Table created in CEO is a listing, by row, of each article reviewed. The rows are divided into 64 columns, each of which describes a single attribute of the article's information as relates to the matrices (described in Appendix A) or other pertinent information. The following is a listing of these columns and their parameters.

Column Definitions

NO.	COLUMN NAME (abbreviation description)	COLUMN TYPE
1	Paper Number	text,left-justified
2	Geographic Region	text,left-justified
3	Author1	text,left-justified
4	Author2	text,left-justified
5	Date	text, centered
6	File Location	text, centered
7	Title	text, left-justified
8	Source	text, left-justified
9	Timber	text, centered
10	Forage	text, centered
11	Water	text, centered
12	Fish	text, centered
13	Roads	text, centered
14	Wildlife	text, centered
15	Recreation	text, centered
16	LBP (loblolly pine)	text, centered
17	SP (slash pine)	text, centered
18	LLP (long-leaf pine)	text, centered
19	SDP (sand pine)	text, centered
20	PP (ponderosa pine)	text, centered
21	LP (lodgepole pine)	text, centered
22	JP (jack pine)	text, centered
23	RP (red pine)	text, centered
24	DF (Douglas-fir)	text, centered
25	M (maples)	text, centered
26	O (oaks)	text, centered
27	Practice	text, left-justified
28	Stocking Level	text, centered
29	Seed Sap Growth (seedling and sapling growth)	text, centered
30	Pole Sawtimber (pole and sawtimber growth)	text, centered
31	Growth Curves (height-growth curves)	text, centered

32	Soil Site (soil/site relationships)	text, centered
33	G and Y Tables (growth and yield tables)	text, centered
34	Economics	text, centered
35	Computer Models	text, centered
36	Range Type	text, left-justified
37	Cow	text, centered
38	Elk	text, centered
39	Deer	text, centered
40	Other Animal	text, centered
41	Pounds of Forage	text, centered
42	Induced Resource Output	text, centered
43	Conversion Number Animals (conversion factor to number of animals)	text, centered
44	Induced Number Animals (induced number of animals)	text, centered
45	Water Quality	text, centered
46	Water Yield	text, centered
47	Water Timing	text, centered
48	Fish Hab (fish habitat)	text, centered
49	Trout	text, centered
50	Salmon	text, centered
51	Other Fish	text, centered
52	No Fish Reported	text, centered
53	Fish E C B (fish emergence, carrying capacity, and biomass models)	text, left-justified
54	Fish No Lb (number or pounds of fish)	text, centered
55	Fish Incr (induced increment of fish)	text, centered
56	Fish To WFUD (conversion of fish to WFUDs)	text, centered
57	Water Conversion Relation (conversion relationships)	text, centered
58	Water Cost Or Value(treatment cost or value of water)	text, centered
59	Water Savings Increment (increment of treatment savings or water value)	text, centered
60	Construction Cost (construction costs)	text, centered
61	Maintenance Cost (maintenance costs)	text, centered
62	Construction Increment (construction cost increment)	text, centered
63	Maintenance Increment (maintenance cost increment)	text, centered
64	Anadromous (anadromous fish)	text, centered

Most entries in these columns are: 1) text strings; 2) an (X) indicating existing information in the particular article; and 3) a (~) or blank space indicating no information for the column reported in the particular article.

There are four exceptions to these types of entries.

Column #2, **Geographic Region**: the entries are E (USFS Regions 8 and 9); M (Regions 1-4); W (Regions 5, 6, and 10); ALL (entire U.S.); or blank space (no region specified in the article).

Column #6, **File Location**: this is a bookkeeping column, therefore, ignore.

Column #34, **Economics**: the entries B (benefits), C (costs), B/C % (benefit-cost ratio), and IRR (internal rate of return) are reported in the 'hardcopy' bibliography, singly or in combination.

Column #53, **Fish** E C B: the entries E (emergence), C (carrying capacity), and B (biomass models) are reported in the 'hardcopy' bibliography, singly or in combination.

The bibliography is an expanding as well as a working tool, because the data table has the capability to store 9,999 rows and 99 columns. Therefore, additional citations will be added periodically. Individuals are encouraged to send published studies and published or unpublished reports documenting soil and water practices (especially those which quantify the economic benefits derived from those practices) to_______________________. These will then become a part of the data base.

Manipulating the Data Table

PRESENT Information Presentation Facility Data General software was used to produce the bibliography accompanying this report. PRESENT allows the user to select data from the data table, sort the data, and to format the data into a report. Queries are written which interact with the data base to produce these reports. PRESENT Information Presentation Facility User's Manual more fully explains PRESENT queries and accompanying commands. A copy of this manual can be obtained from your DG Systems Manager.

The query which produced the bibliography for "Forage Matrix - Citations for Regions 1, 2, 3, and 4" follows.

```
TITLE "FORAGE MATRIX - CITATIONS FOR REGIONS 1, 2, 3 AND 4" CENTER


REPORT 1 AUTHOR1 LEFT AUTHOR2 COLUMN +1 DATE COLUMN +1
REPORT 2 TITLE COLUMN +2
REPORT 3 SOURCE COLUMN +2
REPORT 4 PAPER_NUMBER COLUMN +2 PRACTICE COLUMN +7 RANGE_TYPE COLUMN +5
POUNDS_OF_FORAGE COLUMN +3 INDUCED_RESOURCE_OUTPUT COLUMN +3
CONVERSION_NUMBER_ANIMALS COLUMN +3 INDUCED_NUMBER_ANIMALS COLUMN +3 ECONOMICS
COLUMN +3
REPORT 7
SORT AUTHOR1 DATE
NOHEADERS 1 2 3
HEADER AUTHOR1 " "
HEADER AUTHOR2 " "
HEADER DATE " "
HEADER PAPER_NUMBER "CITATION"
HEADER PRACTICE "PRACTICE"
HEADER RANGE_TYPE "RANGE TYPE"
HEADER POUNDS_OF_FORAGE "POUNDS" "FORAGE  "
HEADER INDUCED_RESOURCE_OUTPUT "INDUCED" "RESOURCE" "OUTPUT"
HEADER CONVERSION_NUMBER_ANIMALS "CONVERSION" "TO NUMBER" "ANIMALS"
sEADER INDUCED_NUMBER_ANIMALS "INDUCED" "NUMBER" "ANIMALS "
HEADER ECONOMICS "ECONOMICS"
SELECT FORAGE = "X" AND GEOGRAPHIC_REGION = "ALL  " OR "M    " OR "E,M  " OR
"M,W  " OR "E,M,W"
PAGESIZE 62 lines 132 COLUMNS
```

The highlighted command phrase, **SELECT FORAGE = "X"**, can be changed to select other information from the bibliography data table. For example, if citations reporting instream flow requirements for river boating are needed, the command, **SELECT RECREATION = "X" AND WATER YIELD = "X"** will pull those citations from the data table. Of course, corresponding commands (i.e., REPORT 4 and HEADER must also be adjusted, and other commands can be changed to suit personal requirements.

The bibliography data table, BIBLIOGRAPHY.DTB, is stored in IS. Through a series of steps the entire bibliography can be copied into the DG user's own CEO staff space as a data table. A sample query for each of the five emphasis areas has been stored in a "dump" file, QUERIES.DTB. This "dump" file can also be copied into the DG user's own CEO staff space and can be used as a formatting guide and easy reference for writing other queries. (Note: The user is only retrieving a copy of the bibliography data table, therefore no damage to the original data table, due to user error, is possible.) Both of these files can be accessed by following the RETRIEVAL and IMPORT steps in the next section.

Bibliography Data Table and Dump File Retrieval

Use IS Retrieval to obtain the current copy of the bibliography data table or the queries dump file. Before retrieval confirm that you have sufficient space in your IS folder to store the file and its contents. For this data table 1000 blocks of IS and CEO space is needed. Extra space may be needed to store files generated during runs.

The steps listed below should help you with the retrieval process.

To retrieve:

Enter IS:

IS MAIN MENU

Select 3. Utilities

Select 6. Retrieval and FCCC Access

Select 1. Retrieval

Location of File to be Retrieved (type in the underlined items)

Host Name: s28a
Level (1. Public, 2. Staff): 1. Public
Drawer Name: distribution
Folder Name: system
File Name: bibliography.dtb or queries.dtb

Location into which to put the file

Level
Drawer Name:
Folder Name:
File Name:

This is the location in IS-CLI on the user's DG system where the data table or queries will be stored. The Level must be staff or public. The Drawer and Folder can either be public or the user's staff space.

Shall I retrieve the File now?

Type Y or N (If N, you will be prompted for a time)

A message describing the success or failure of the retrieval will be generated and sent to your inbox.

Bibliography Data Table and Dump File Import to CEO

Documentation is contained in two WRD files, DOCI and DOCII. They are retrieved as described above and then must be imported into CEO.

To import:

CEO Main Menu

Select 5. Filing

Select 7. Import

Type filename (instructions below)

Type in complete pathname where file is stored in CLI or IS-CLI.
:public:distribution:system:bibliography.dtb

Filing Menu

Drawer name ______________________
Folder name ______________________
Document name ____________________

Type in the Drawer, Folder, and Document name where the data table and/or queries will be stored in personal or staff CEO space. The user will be prompted to fill in the document summary. Then the requested file will be imported into this

named document. After successful import the DOCI and DOCII files may be deleted from personal/staff IS-CLI space.

[United] States
[Dep]artment of
Agriculture

Forest
Service

Watershed and
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Washington, D.C.

December 1987

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Approaches to Watershed Economics Through Example

Bibliography Part II, Appendix B

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Bibliography Part II, Appendix B

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CITATIONS FOR ENHANCED WATER MODEL

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
ALDON, EARL F.		1980							
MICRO-CATCHMENT WATER HARVESTING									
VEG RECLAM OF MINE WASTES & TAILINGS IN SW, UNIV OF AZ-MINE RECLAMATION CENTER									
PAPER NO. 391	VEGETATIVE MGMT	DESERT GRASSLAND	-	X	-	-	-	-	-
ANDERSON, HENRY W. ET AL		1986							
FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY									
USFS PSW-18 GENERAL TECHNICAL REPORT									
PAPER NO. 719	GENERAL WATERSHED MGMT	-	X	X	X	-	-	-	-
BAKER, MALCHUS B., JR.		1982							
HYDROLOGIC REGIMES OF FORESTED AREAS IN THE BEAVER CREEK WATERSHED									
USFS RM-90 GENERAL TECHNICAL REPORT									
PAPER NO. 517	GENERAL	FORESTED	-	X	-	-	-	-	-
BAKER, MALCHUS B., JR.		1984							
CHANGES IN STREAMFLOW IN AN HERBICIDE-TREATED PINYON-JUNIPER WATERSHED IN AZ									
WATER RESOURCES RESEARCH 20(11):1639-1642									
PAPER NO. 513	VEGETATIVE MGMT	PINYON-JUNIPER	-	X	-	-	-	-	-
BAKER, MALCHUS B., JR.		1986							
EFFECTS OF PONDEROSA PINE TREATMENTS ON WATER YIELD IN ARIZONA									
WATER RESOURCES RESEARCH 22(1):67-73									
PAPER NO. 488	VEGETATIVE MGMT	PONDEROSA PINE	-	X	X	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
BEVENGER, G. S. TROENDLE, C. A. 1984									
COON CREEK WATER YIELD AUGMENTATION PILOT PROJECT									
CONF PROC WATER FOR 21ST CENTURY: WILL IT BE THERE?, S. METHODIST UNIV:240-251									
PAPER NO. 484	VEGETATIVE MGMT	FORESTED	-	X	-	-	-	-	-
BLACKBURN, WILBERT H. 1984									
IMPACTS OF GRAZING INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC									
DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO									
PAPER NO. 411	GRAZING SYSTEM	VARIOUS	X	X	-	-	-	-	-
BROOKSHIRE, DAVID S. ET AL 1986									
EXISTENCE VALUES & NORMATIVE ECONOMICS: IMPLICATION FOR VALUING WATER RESOURCE									
WATER RESOURCES RESEARCH 22(11):1509-1518									
PAPER NO. 437	GENERAL PAPER	-	-	-	-	-	-	-	B,C
BROWN, THOMAS C. 1974									
CHAPARRAL CONVERSION POTENTIAL IN AZ, PART II: AN ECONOMIC ANALYSIS									
USFS RM-127 RESEARCH PAPER									
PAPER NO. 521	VEGETATIVE MGMT	CHAPARRAL	X	X	-	X	X	X	B,C,B/C
BROWN, THOMAS C. 1982									
MONETARY VALUATION OF TIMBER, FORAGE, & WATER YIELDS FROM PUBLIC FOREST LANDS									
USFS RM-95 GENERAL TECHNICAL REPORT									
PAPER NO. 734	ECONOMIC ANALYSIS	-	-	X	-	-	X	-	B,C

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
BROWN, THOMAS C.	ET AL	1986					
CONSUMPTIVE USE OF INCREMENTAL FLOWS IN THE COLORADO RIVER BASIN							
DRAFT							
PAPER NO. 434	VEGETATIVE MGMT	COLORADO RIVER BASIN	- X X	-	-	-	-
BROWN, THOMAS C.		1986					
THE VALUE OF INCREMENTAL WATER FLOW FROM PINYON-JUNIPER LANDS							
USFS INT-215 GENERAL TECHNICAL REPORT:177-182							
PAPER NO. 445	VEGETATIVE MGMT	PINYON-JUNIPER	- X X	X	X	X	B,C,B/C
BUCKHOUSE, JOHN C.	GIFFORD, GERALD F.	1976					
GRAZING/DEBRIS BURN ON PINYON-JUNIPER SITES-SOME CHEM WATER QUAL IMPLICATIONS							
JOURNAL OF RANGE MANAGEMENT 29(4):299-301							
PAPER NO. 531	VEGETATIVE MGMT	PINYON-JUNIPER	X - -	-	-	-	-
BUCKHOUSE, JOHN C.	GIFFORD, GERALD F.	1976					
WATER QUALITY IMPLICATIONS OF CATTLE GRAZING ON SEMIARID WATERSHED IN SE UTAH							
JOURNAL OF RANGE MANAGEMENT 29(2):109-113							
PAPER NO. 534	GRAZING	PINYON-JUNIPER	X - -	-	-	-	-
BURROUGHS, E. R.	ET AL	1984					
RELATIVE EFFECTIVENESS OF ROCKED ROADS AND DITCHES IN REDUCING SURFACE EROSION							
21ST ANNUAL ENGINEERING GEOLOGY & SOILS ENGINEERING SYMP PROC, U OF ID:251-263							
PAPER NO. 620	ROADS		X - -	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
CIBOLA NATIONAL FOREST	-	1980							
WASHITA PL-534 PROJECT - FLOOD PREVENTION									
USFS REGION 3									
PAPER NO. 698	FOREST REPORT		-	-	-	-	-	-	B,C
CITY OF FORT COLLINS		1985							
ANNUAL OPERATING REPORT, WATER AND WASTEWATER UTILITY									
CITY OF FORT COLLINS, COLORADO									
PAPER NO. 431	-	MUNICIPAL	X	X	X	-	X	-	B,C
CLARK, EDWIN H. II		1985							
THE OFF-SITE COSTS OF SOIL EROSION									
JOURNAL OF SOIL AND WATER CONSERVATION 40(1):19-22									
PAPER NO. 447	GENERAL PAPER	-	X	-	-	X	X	-	C
CLARK, ROBERT M.	ET AL	1984							
COST AND BENEFITS OF DRINKING WATER TREATMENT									
JOURNAL OF ENVIRONMENTAL SYSTEMS 14(1):1-29									
PAPER NO. 432	GENERAL PAPER	-	X	-	-	X	X	X	B,C
CLARY, WARREN P.	FFOLLIOTT, PETER F.	1969							
WATER HOLDING CAPACITY OF PONDEROSA PINE FOREST FLOOR LAYERS									
JOURNAL OF SOIL AND WATER CONSERVATION 24(1)									
PAPER NO. 306	RANGE REHABILITATION	PONDEROSA PINE	-	X	-	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
CLARY, WARREN P.		1974							
PINYON-JUNIPER CONTROL - DOES IT PAY?									
18TH ANNUAL ARIZONA WATERSHED SYMPOSIUM PROC:26-29									
PAPER NO. 309	RANGE REHABILITATION	PINYON-JUNIPER	-	X	-	-	-	-	B,C
CLARY, WARREN P. ET AL		1974							
EFFECTS OF PINYON-JUNIPER REMOVAL ON NATURAL RESOURCE PRODUCTS & USES IN AZ									
USFS RM-128 RESEARCH PAPER									
PAPER NO. 316	RANGE REHABILITATION	PINYON-JUNIPER	X	X	-	-	-	-	B,C,B/C
CLARY, WARREN P.		1975							
MULTIPLE USE EFFECTS OF MANIPULATING PINYON-JUNIPER									
WATERSHED MANAGEMENT SYMPOSIUM, LOGAN, UTAH									
PAPER NO. 307	RANGE REHABILITATION	PINYON-JUNIPER	X	X	-	-	-	-	B,C,B/C
CLARY, WARREN P.		1975							
RANGE MGMT & ITS ECOL BASIS IN PONDEROSA PINE TYPE OF AZ: STATUS OF KNOWLEDGE									
USFS RM-158 RESEARCH PAPER									
PAPER NO. 404		PONDEROSA PINE	X	X	-	-	-	-	B,C
CLINE, LEO D. ET AL		1983							
EFFECTS OF HIGHWAY CONSTRUCT ON WATER QUAL & BIOTA IN ADJACENT COLO MTN STREAM									
USFS RM-429 RESEARCH NOTE									
PAPER NO. 549	ROADS	RIPARIAN	X	-	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
CURRIE, PAT O.		1975							
GRAZING MGMT OF PONDEROSA PINE-BUNCHGRASS RANGES OF CENTRAL ROCKY MOUNTAINS									
USFS RM-159 RESEARCH PAPER									
PAPER NO. 401	MULTIPLE	PONDEROSA-BUNCHGRASS	X	X	-	-	-	-	-
CUSTER NATIONAL FOREST		1987							
FOREST REPORT									
USFS REGION 1									
PAPER NO. 693	FOREST REPORT		X	-	-	-	-	-	-
DARLING, LESLIE A. COLTHARP, GEORGE B.		1973							
EFFECTS OF LIVESTOCK GRAZING ON THE WATER QUALITY OF MOUNTAIN STREAMS									
COPIES AVAILABLE UPON REQUEST									
PAPER NO. 533	GRAZING	RIPARIAN	X	-	-	-	-	-	-
DAVIS, E. A.		1981							
TEBUTHIURON RESIDUE IN STREAMWATER FROM SPOT-TREATED CHAPARRAL WATERSHED IN AZ									
WESTERN SOCIETY OF WEED SCIENCE: 1981 RESEARCH PROGRESS REPORT:52-53									
PAPER NO. 524		CHAPARRAL	X	X	-	-	-	-	-
DAVIS, EDWIN A.		1980							
EFFECTS OF CONVERT CHAPARRAL TO GRASS ON THE CHEM COMPOSITION OF STREAM WATER									
WESTERN SOCIETY OF WEED SCIENCE: 1980 RESEARCH PROGRESS REPORT:75-77									
PAPER NO. 523	VEGETATIVE MGMT	CHAPARRAL	X	X	-	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
DAVIS, EDWIN A.		1982							
STREAM WATER NUTRIENT CHANGES ASSOC WITH THE CONVERSION OF ARIZONA CHAPARRAL									
USFS PSW-58 GENERAL TECHNICAL REPORT									
PAPER NO. 526	VEGETATIVE MGMT	CHAPARRAL	X	-	-	-	-	-	-
DAVIS, EDWIN A.		1984							
CONVERSION OF ARIZONA CHAPARRAL TO GRASS INCREASES WATER YIELD & NITRATE LOSS									
WATER RESOURCES RESEARCH 20(11):1643-1649									
PAPER NO. 512	VEGETATIVE MGMT	CHAPARRAL	X	X	-	-	-	-	-
DEBANO, L. P. ET AL		1984							
ENHANCEMENT OF RIPARIAN VEGETATION FOLLOWING SHRUB CONTROL IN AZ CHAPARRAL									
JOURNAL OF SOIL AND WATER CONSERVATION 39(5):317-320									
PAPER NO. 518	VEGETATIVE MGMT	CHAPARRAL	-	X	-	-	-	-	-
FANNIN, TIMOTHY E. ET AL		1985							
MULTIPLE REGRESSION ANAL FOR EVAL NON-PT SOURCE CONTRIBUTIONS TO WATER QUALITY									
COPIES AVAILABLE UPON REQUEST									
PAPER NO. 426	GENERAL PAPER	-	X	-	-	-	-	-	-
FISHLAKE NATIONAL FOREST		1987							
FOREST REPORT									
USFS REGION 4									
PAPER NO. 695	FOREST REPORT	-	X	X	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
FOGEL, MARTIN M.	ET AL	1985							
IDENTIFICATION OP USES OP INCREASED STREAMFLOW ASSOC WITH VEG MODIFICATION									
USFS RM, FORT COLLINS, COLORADO									
PAPER NO. 519	VEGETATIVE MGMT	-	-	X	-	-	-	-	B
FRAAS, ARTHUR G.	MUNLEY, VINCENT G.	1984							
MUNICIPAL WASTEWATER TREATMENT COST									
JOURNAL OF ENVIRONMENTAL ECONOMICS AND MANAGEMENT 11(1984):28-38									
PAPER NO. 448	GENERAL PAPER	-	X	-	-	-	-	-	C
GALLATIN NATIONAL FOREST		1986							
DOCUMENTATION OP HYDROLOGIC COSTS & BENEPITS FOR SOURDOUGH E.A.									
USFS REGION 1									
PAPER NO. 688	FOREST REPORT	-	X	X	-	-	X	-	C,B
GARN, HERBERT S.		1986							
QUANTIFICATION OP INSTREAM PLOW NEEDS OF WILD & SCENIC RIVER FOR WATER RIGHTS									
WATER RESOURCES BULLETIN 22(5):745-751									
PAPER NO. 565	INSTREAM PLOW NEEDS	-	X	-	-	-	-	-	-
GARRETT, LAWRENCE D.		1981							
MULTIRESOURCE RESEARCH & ITS IMPLICATIONS TO MGMT: THE BEAVER CREEK BIOSPHERE									
WORKSHOP ON WILDLIFE & RANGE RES NEEDS IN N MEXICO & SW US, RIO RICO AZ:40-44									
PAPER NO. 525	-	PNYN-JNPR & PONDRSA	X	-	-	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
GARY, HOWARD L.		1975							
WATERSHED MGMT PROBLEMS & OPPORTUNITIES FOR COLORADO FRONT RANGE PONDEROSA PIN									
USPS RM-139 RESEARCH PAPER									
PAPER NO. 725	GENERAL WATERSHED MGMT	PONDEROSA PINE	X	X	X	-	-	-	-
GARY, HOWARD L.		1980							
PATCH CLEARCUTS TO MANAGE SNOW IN LODGEPOLE PINE									
AM SOC CIVIL ENGINEERS, WATERSHED MANAGEMENT SYMPOSIUM PROC 1:335-346									
PAPER NO. 494	LOGGING SYSTEM	FORESTED	-	X	-	-	-	-	-
GIFFORD, GERALD F. ET AL		1970							
INFILTRATION & EROSION STUDIES ON PINYON-JUNIPER CONVERSION SITES IN S. UTAH									
JOURNAL OF RANGE MANAGEMENT 23(6):402-406									
PAPER NO. 308	RANGE REHABILITATION	PINYON-JUNIPER	X	X	-	-	-	-	-
GIFFORD, GERALD F.		1973							
RUNOFF & SEDIMENT YIELDS FROM RUNOFF PLOTS ON CHAINED PINYON-JUNIPER SITE-UTAH									
JOURNAL OF RANGE MANAGEMENT 26(6):440-443									
PAPER NO. 325	RANGE REHABILITATION	PINYON-JUNIPER	X	X	-	-	-	-	-
GLENN, BRUCE P.		1970							
A GUIDE TO USING INTEREST FACTORS IN ECONOMIC ANALYSIS OF WATER PROJECTS									
USDI BUREAU OF RECLAMATION (DECEMBER) GPO 832-593									
PAPER NO. 443	GENERAL PAPER	-	-	-	-	-	-	-	B,C,B/C,IRR

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
HEEDE, BURCHARD H.		1983					
SEDIMENT SOURCE AREAS AFTER TIMBER HARVEST IN MIXED CONIFER							
3RD ANNUAL AGU FRONT RANGE BRANCH HYDROLOGY DAYS PROC, CO STATE UNIV:139-156							
PAPER NO. 473	LOGGING SYSTEM	FORESTED	X - -	-	-	-	-
HEEDE, BURCHARD H.		1984					
SEDIMENT SOURCE AREAS RELATED TO TIMBER HARVEST ON SELECTED ARIZONA WATERSHEDS							
SYMPOSIUM ON EFFECTS OF FOREST LAND USE ON EROSION & SLOPE STABILITY:123-130							
PAPER NO. 472	LOGGING SYSTEM	FORESTED	X - -	-	-	X	-
HEEDE, BURCHARD H.		1984					
OVERLAND FLOW & SEDIMENT DELIVERY: EXP WITH SMALL SUBDRAINAGE IN SW PONDEROSA							
JOURNAL OF HYDROLOGY 72:261-273							
PAPER NO. 548	ROADS	FORESTED	X - -	-	-	-	-
HEEDE, BURCHARD H.		1985					
APPLIC OF GEOMORPH CONCEPTS TO EVAL TIMBER HARVEST INFLUENCE ON STREAM CHANNEL							
ZEITSCHRIFT FUR GEOMORPHOLOGIE N.F. SUPPL-BD 55:121-130 (BERLIN, GERMANY)							
PAPER NO. 475	LOGGING SYSTEM	FORESTED	X - -	-	-	-	-
HELVEY, J. D.	ET AL	1985					
PLANT NUTRIENT LOSSES BY SOIL EROSION AND MASS MOVEMENT AFTER WILDFIRE							
JOURNAL OF SOIL AND WATER CONSERVATION 40(1):168-173							
PAPER NO. 522	VEGETATIVE MGMT	-	X - -	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
HIBBERT, A. R.	ET AL	1982							
WATER YIELD CHANGES RESULTING FROM TREATMENT OF ARIZONA CHAPARRAL									
USFS PSW-58 GENERAL TECHNICAL REPORT									
PAPER NO. 516	VEGETATIVE MGMT	CHAPARRAL	-	X	-	-	-	-	-
HIBBERT, A. R.	DAVIS, E. A.	1986							
STREAMFLOW RESPONSE TO CONVERTING ARIZONA CHAPARRAL IN A MOSAIC PATTERN									
AM SOC CIVIL ENGINEERS PROC: HYDRO & WATER RES IN AZ & SW. VOL. 16:123-131									
PAPER NO. 515	VEGETATIVE MGMT	CHAPARRAL	X	X	-	-	-	-	-
HIBBERT, ALDEN R.	ET AL	1974							
CHAPARRAL CONVERSION POTENTIAL IN AZ, PART I: WATER YIELD RESPONSE & EFFECTS									
USFS RM-126 RESEARCH PAPER									
PAPER NO. 520	VEGETATIVE MGMT	CHAPARRAL	X	X	-	-	-	-	-
HIBBERT, ALDEN R.		1979							
MANAGING VEGETATION TO INCREASE FLOW IN THE COLORADO RIVER BASIN									
USFS RM-66 GENERAL TECHNICAL REPORT									
PAPER NO. 510	VEGETATIVE MGMT		-	X	-	X	X	X	B,C
HIBBERT, ALDEN R.		1983							
WATER YIELD IMPROVEMENT POTENTIAL BY VEGETATION MGMT ON WESTERN RANGELANDS									
WATER RESOURCES BULLETIN 19(3):375-381									
PAPER NO. 511	VEGETATIVE MGMT		-	X	-	-	-	-	B,C

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
HIBBERT, ALDEN R.		UNKWN							
OPPORTUNITIES TO INCREASE WATER YLD IN THE SOUTHWEST BY VEGETATION MANAGEMENT									
USFS RM, TEMPE, ARIZONA									
PAPER NO. 514	VEGETATIVE MGMT	VARIOUS	-	X	-	-	-	-	-
HINOMOTO, HIROHIDE		1971							
UNIT & TOTAL COST FUNCTIONS FOR WATER TREATMENT BASED ON KOENIG'S DATA									
WATER RESOURCES RESEARCH 7(5):1064-1069									
PAPER NO. 444	GENERAL		X	-	-	X	X	-	C
JOHNSON, R. ROY (ED) JONES, DALE A. (ED)		1977							
IMPORTANCE, PRESERVATION AND MANAGEMENT OF RIPARIAN HABITAT: A SYMPOSIUM									
USFS RM-43 GENERAL TECHNICAL REPORT									
PAPER NO. 731	GENERAL WATERSHED MGMT	RIPARIAN	X	-	-	-	-	-	-
JOHNSON, STEVEN R. ET AL		1978							
RANGE CATTLE IMPACTS ON STREAM WATER QUALITY IN THE COLORADO FRONT RANGE									
USFS RM-359 RESEARCH NOTE									
PAPER NO. 536	GRAZING	RIPARIAN	-	-	-	-	-	-	-
KAUFMANN, MERRILL R.		1983							
CANOPY MODEL (RM-CWU)-DETERM TRANSPIR SUBALPINE FOREST II. CONSUMP WATER USE									
CANADIAN JOURNAL OF FOREST RESEARCH 14:227-232									
PAPER NO. 492	LOGGING SYSTEM	FORESTED	-	X	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
KAUFMANN, MERRILL R.		1984							
CANOPY MODEL (RM-CWU) FOR DETERM TRANSPIRATION SUBALPINE FOREST I. MODEL LEVEL									
CANADIAN JOURNAL OF FOREST RESEARCH 14:218-226									
PAPER NO. 491	LOGGING SYSTEM	FORESTED	-	X	-	-	-	-	-
KAUFMANN, MERRILL R.		1985							
MODELLING TRANSPIRATION OF SUBALPINE TREES IN THE CENTRAL ROCKY MOUNTAINS									
SYMP BY COMM ON WATERSHED MGMT/IRRIG & DRAIN, AM SOC CIVIL ENGINEERS 1:61-68									
PAPER NO. 489	LOGGING SYSTEM	FORESTED	-	X	-	-	-	-	-
KAUFMANN, MERRILL R.		1985							
NEW SILVICULTURAL OPTIONS FOR TIMBER AND WATER YIELD IN THE ROCKY MOUNTAINS									
SOCIETY OF AMERICAN FORESTERS NATIONAL CONVENTION PROC:237-242									
PAPER NO. 490	LOGGING SYSTEM	FORESTED	-	X	-	-	-	-	-
LEAF, CHARLES F.		1975							
WATERSHED MGMT IN CENTRAL & SOUTHERN ROCKY MTNS: SUMMARY OF STATUS OF KNOWLEDG									
USFS RM-142 RESEARCH PAPER									
PAPER NO. 723	GENERAL WATERSHED MGMT	SAGEBRUSH	X	X	-	-	-	-	-
MARTIN, KIRKE L.	ET AL	1985							
GIARDIA AND OTHER PATHOGENS IN WESTERN WATERSHEDS									
1985 SOCIETY OF AMERICAN FORESTERS NATIONAL CONVENTION PROC:143-147									
PAPER NO. 541	RECREATION	FORESTED	X	-	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
MONZINGO, DON L., JR. STEVENS, DAVID R. 1986									
GIARDIA CONTAMINATION OP SURFACE WATER: SURVEY OF 3 SELECT BACKCOUNTRY STREAMS									
WATER RESOURCES DIVISION, NATIONAL PARK SERVICE, WATER RESOURCES REPORT 86-2									
PAPER NO. 538	RECREATION	RIPARIAN	X	-	-	-	-	-	-
NARAYANAN, RANGESAN 1986									
EVALUATION OP RECREATIONAL BENEFITS OF INSTREAM FLOWS									
JOURNAL OP LEISURE RESEARCH 18(2):116-128									
PAPER NO. 560	INSTREAM FLOW NEEDS	RIVER	-	X	X	X	X	X	B,C
NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OP SCIENCES 1984									
ECONOMIC FEASIBILITY AND PUBLIC RANGE INVESTMENT									
DEVELOPING STRATEGIES FOR RANGELAND MGMT, WESTVIEW PRESS, BOULDER, CO, 1984									
PAPER NO. 375	GENERAL PAPER	ALL	X	X	-	-	-	-	B,C,B/C,IRR
NEWMAN, HOWARD C. SCHMIDT, WYMAN C. 1979									
SILVICULTURE AND RESIDUE TREATMENTS APFECT WATER USED BY A LARCH/FIR FOREST									
USFS INT-90 GENERAL TECHNICAL REPORT									
PAPER NO. 496	LOGGING SYSTEM	FORESTED	-	X	-	-	-	-	-
ORR, HOWARD K. 1975									
WATERSHED MANAGEMENT IN THE BLACK HILLS: THE STATUS OP OUR KNOWLEDGE									
USFS RM-141 RESEARCH PAPER									
PAPER NO. 724	GENERAL WATERSHED MGMT		X	X	-	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
RAUZI, FRANK	HANSON, CLAYTON L.	1966							
WATER INTAKE AND RUNOFF AS AFFECTED BY INTENSITY OF GRAZING									
JOURNAL OF RANGE MANAGEMENT 19(6):351-356									
PAPER NO. 535	GRAZING	MIXED PRAIRIE	X	X	-	-	-	-	-
REYNOLDS, HUDSON G.	ET AL	1970							
GAMBEL OAK FOR SOUTHWESTERN WILDLIFE									
JOURNAL OF FORESTRY (SEPT 1970):545-547									
PAPER NO. 346		PONDEROSA PINE	-	X	-	-	-	-	-
RICH, LOWELL R.	REYNOLDS, HUDSON G.	1963							
GRAZING IN RELATION TO RUNOFF & EROSION ON SOME CHAPARRAL WATERSHEDS OF CTR AZ									
JOURNAL OF RANGE MANAGEMENT 16(6):322-326									
PAPER NO. 417	GRAZING SYSTEM	CHAPARRAL	-	X	-	-	-	-	B
RYCHERT, ROBERT C.	STEPHENSON, GORDON R.	1986							
LACTOSE NEGATIVE COLI FROM RANGELAND STREAMS: SOURCE, ANTIBIOTIC RESISTANCE...									
WATER RESOURCES BULLETIN 22(1):39-42									
PAPER NO. 530	GRAZING	RIPARIAN	X	-	-	-	-	-	-
SAWTOOTH NATIONAL FOREST	-	1986							
STANLEY BASIN ANALYSIS, SAWTOOTH NATIONAL RECREATION AREA									
USFS SAWTOOTH NATIONAL FOREST									
PAPER NO. 714	HABITAT IMPROVEMENT	-	X	-	-	-	-	-	B,C,B/C

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
SKOVLIN, JON M. 1984 IMPACTS OF GRAZING ON WETLANDS & RIPARIAN HABITAT: A REVIEW OF OUR KNOWLEDGE DEVELOPING STRATEGIES FOR RNGLD MGT, WESTVIEW PRESS, BOULDER CO 1984:1001-1103 PAPER NO. 532	GRAZING	RIPARIAN	X	-	-	-	-	-	B
SMART, ALAN W. FLEMING, WILLIAM M. 1985 CONSUMPTIVE WATER USE IN ARTIFICIAL SNOWMAKING SANTA FE SKI AREA, NEW MEXICO NEW MEXICO STATE ENGINEER OFFICE, TECHNICAL REPORT 45 PAPER NO. 537	RECREATION	-	-	X	X	-	-	-	-
SMITH, V. KERRY ET AL 1983 ESTIMATING WATER QUALITY BENEFITS: AN ECONOMETRIC ANALYSIS SOUTHERN ECONOMIC JOURNAL:50(2):422-437 PAPER NO. 440	RECREATION	-	X	-	-	X	X	X	B,C
STORMER, FRED A. GUTHERY, FRED S. 1982 IRRIGATION AND WILDLIFE IN THE SOUTHERN AND CENTRAL GREAT PLAINS 1982 ANNUAL MEETING, GREAT PLAINS AGRICULTURAL COUNCIL, NORTH PLATTE, NE:41-48 PAPER NO. 349	-	-	-	-	-	-	-	-	-
STURGES, DAVID L. 1975 HYDRO RELATION ON UNDISTURB/CONVERT BIG SAGEBRUSH LANDS: STATUS OF KNOWLEDGE USFS RM-140 RESEARCH PAPER PAPER NO. 315	RANGE REHABILITATION	SAGEBRUSH	X	X	-	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
TABLER, RONALD D. STURGES, DAVID L. 1986 WATERSHED TEST OF A SNOW FENCE TO INCREASE STREAMFLOW: PRELIMINARY RESULTS COLD REGIONS HYDROLOGY SYMPOSIUM, AMERICAN WATER RESOURCES ASSN (JULY):53-61							
PAPER NO. 446	VEGETATIVE MGMT	SAGEBRUSH	- X X	-	X	-	B,C
TROENDLE, C. A. 1983 POTENTIAL FOR WATER YIELD AUGMENTATION FROM FOREST MGMT IN ROCKY MTN REGION WATER RESOURCES BULLETIN 19(3):359-373							
PAPER NO. 481	VEGETATIVE MGMT	FORESTED	- X -	-	-	-	-
TROENDLE, C. A. MEIMAN, J. R. 1984 OPTIONS FOR HARVESTING TIMBER TO CONTROL SNOWPACK ACCUMULATION 52ND ANNUAL MEETING, WESTERN SNOW CONF PROC 1:86-97							
PAPER NO. 493	LOGGING SYSTEM	FORESTED	- X -	-	-	-	-
TROENDLE, C. A. 1985 THE EFFECT OF TIMBER HARVEST ON THE WATER BALANCE OF THE SUBALPINE FORESTS SOCIETY OF AMERICAN FORESTERS NATIONAL CONVENTION PROC:148-152							
PAPER NO. 482	VEGETATIVE MGMT	FORESTED	- X -	-	-	-	-
TROENDLE, C. A. KING, R. M. 1985 THE EFFECT OF TIMBER HARVEST ON THE FOOL CREEK WATERSHED, 30 YEARS LATER WATER RESOURCES RESEARCH 21(12):1915-1922							
PAPER NO. 483	VEGETATIVE MGMT	FORESTED	- X -	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
TROENDLE, CHARLES A. 1980 WATERSHED MANAGEMENT IN THE ROCKY MOUNTAINS PROC ROCKY MOUNTAIN FOREST INDUSTRIES CONF:25-45 PAPER NO. 486	VEGETATIVE MGMT	FORESTED	-	X	-	-	-	-	-
TROENDLE, CHARLES A. LEAF, CHARLES F. 1981 EFFECTS OF TIMBER HARVEST IN THE SNOW ZONE ON VOLUME AND TIMING OF WATER YIELD INTERIOR WEST WATERSHED MANAGEMENT, COOP EXTENSION, WA STATE UNIV:231-243 PAPER NO. 495	VEGETATIVE MGMT	FORESTED	X	X	X	-	-	-	-
TROENDLE, CHARLES A. 1983 DEADHORSE EXPERIMENT: A FIELD VERIFICATION OF SUBALPINE WATER BALANCE MODEL USFS RM-425 RESEARCH NOTE PAPER NO. 485	VEGETATIVE MGMT	FORESTED	X	X	-	-	-	-	-
TROENDLE, CHARLES A. LEAF, CHARLES F. UNKWN HYDROLOGY, CHAPTER III AN APPROACH TO WATER RES EVAL OF NON-POINT SILVIC SOURCES, EPA-60018-80-012 PAPER NO. 500	LOGGING SYSTEM	FORESTED	-	X	X	-	-	-	-
TURNER, GEORGE T. PAULSEN, HAROLD A., JR. 1976 MANAGEMENT OF MOUNTAIN GRASSLANDS IN CENTRAL ROCKIES: STATUS OF OUR KNOWLEDGE USFS RM-161 RESEARCH PAPER PAPER NO. 400	MULTIPLE	MOUNTAIN GRASSLAND	X	X	-	-	-	-	B,C

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
UNGER, SAMUEL G.	ET AL	1973							
STATE-OF-ART REVIEW: WATER POLLUTION CONTROL BENEFITS AND COSTS - VOL. 1									
US ENVIRONMENTAL PROTECTION AGENCY, EPA-600/5-73-008A									
PAPER NO. 441	GENERAL PAPER	-	X	-	-	X	X	-	B,C,B/C
USDA FOREST SERVICE		1971							
EFFECT OF FOREST-MANAGEMENT PRACTICES ON NUTRIENT LOSSES									
USDA FOREST SERVICE, 1971									
PAPER NO. 453	LOGGING SYSTEM	FORESTED	X	-	-	-	-	-	-
USDA SCS	USDA FS	1958							
SANDIA MOUNTAINS TRIBUTARIES OF THE RIO GRANDE WATERSHED, SANDOVAL COUNTY, NM									
USFS REGION 3									
PAPER NO. 701	FLOOD CONTROL	-	-	-	-	-	-	-	B,C
WARD, FRANK A.		1982							
THE DEMAND FOR AND VALUE OF RECREATIONAL USE OF WATER IN SE NEW MEXICO									
NEW MEXICO STATE UNIV, AGRICULTURAL EXPERIMENT STATION, RESEARCH REPORT 465									
PAPER NO. 540	RECREATION	RESERVOIRS	X	X	-	-	X	X	B,C
WARD, FRANK A.		1984							
OPTIMALLY MANAGING WILD RIVERS FOR INSTREAM BENEFITS									
1984 NATIONAL RIVER RECREATION SYMPOSIUM PROC, LA STATE UNIV:285-300									
PAPER NO. 559	INSTREAM FLOW NEEDS	RIVER	-	X	X	X	X	X	B,C

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
WARD, TIMOTHY J. BAKER, MALCHUS B., JR. 1984 SEDIMENT FROM MANAGED PINE WATERSHED IN NORTHERN CENTRAL ARIZONA CONF PROC SPONSORED BY IRRIG & DRAIN DIV, AM SOC CIV ENGINEERS:552-558 PAPER NO. 474	LOGGING SYSTEM	FORESTED	X	-	-	-	-	-	-
WARRINGTON, GORDON E. UNKWN ESTIMATING SOIL EROSION FOR FOREST LAND MANAGEMENT PLANNING: A PROCEDURE USFS RM, FORT COLLINS, COLORADO PAPER NO. 542	MULTIPLE	FORESTED	X	-	-	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 5, 6 AND 10

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
ANDERSON, HENRY W. ET AL 1986							
FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY							
USFS PSW-18 GENERAL TECHNICAL REPORT							
PAPER NO. 719	GENERAL WATERSHED MGMT	-	X X X	-	-	-	-
BLACKBURN, WILBERT H. 1984							
IMPACTS OF GRAZING INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC							
DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO							
PAPER NO. 411	GRAZING SYSTEM	VARIOUS	X X -	-	-	-	-
BROOKSHIRE, DAVID S. ET AL 1986							
EXISTENCE VALUES & NORMATIVE ECONOMICS: IMPLICATION FOR VALUING WATER RESOURCE							
WATER RESOURCES RESEARCH 22(11):1509-1518							
PAPER NO. 437	GENERAL PAPER	-	- - -	-	-	-	B,C
BROWN, GEORGE W. KRYGIER, JAMES T. 1971							
CLEAR-CUT LOGGING AND SEDIMENT PRODUCTION IN THE OREGON COAST RANGE							
WATER RESOURCES RESEARCH 7(5):1189-1198							
PAPER NO. 480	LOGGING SYSTEM	FORESTED	X - -	-	-	-	-
CLARK, EDWIN H. II 1985							
THE OFF-SITE COSTS OF SOIL EROSION							
JOURNAL OF SOIL AND WATER CONSERVATION 40(1):19-22							
PAPER NO. 447	GENERAL PAPER	-	X - -	X	X	-	C

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 5, 6 AND 10

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
CLARK, ROBERT M.	ET AL	1984					
COST AND BENEFITS OF DRINKING WATER TREATMENT							
JOURNAL OF ENVIRONMENTAL SYSTEMS 14(1):1-29							
PAPER NO. 432	GENERAL PAPER	-	X - -	X	X	X	B,C
CROMACK, K., JR.		1978					
COMPARISON OF HARVESTING METHODS & THEIR IMPACT ON SOILS & ENVIRONMENT IN PNW							
5TH NORTH AMERICAN FOREST SOILS CONF PROC:449-476							
PAPER NO. 476	LOGGING SYSTEM	FORESTED	X - -	-	-	-	-
DUNCAN, S. H.		1986					
PEAK STREAM DISCHARGE DURING 30 YRS OF SUSTAIN YIELD TIMBER MGMT...IN WA STATE							
NORTHWEST SCIENCE 60(4):258-264							
PAPER NO. 498	LOGGING SYSTEM	FORESTED	- X X	-	-	-	-
DYKSTRA, DENNIS P.	FROEHLICH, HENRY A.	1976					
COSTS OF STREAM PROTECTION DURING TIMBER HARVEST							
JOURNAL OF FORESTRY (OCT 1976):684-687							
PAPER NO. 737	LOGGING SYSTEM	-	X - -	-	-	-	C
FELLER, M. C.	KIMMINS, J. P.	1984					
EFFECTS CLEARCUT/SLASH BURNING ON STREAMWATER CHEM & WATERSHED NUTRIENT BUDGET							
WATER RESOURCES RESEARCH 20(1):29-40							
PAPER NO. 478	LOGGING SYSTEM	FORESTED	X - -	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 5, 6 AND 10

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
FRAAS, ARTHUR G. MUNLEY, VINCENT G. 1984 MUNICIPAL WASTEWATER TREATMENT COST JOURNAL OF ENVIRONMENTAL ECONOMICS AND MANAGEMENT 11(1984):28-38 PAPER NO. 448	GENERAL PAPER	-	X	-	-	-	-	-	C
FREDRIKSEN, R. L. ET AL 1973 IMPACT TIMBER HARVEST, FERTIL & HERBICIDE TREAT ON STREAMWATER QUAL: W OR & WA 4TH NORTH AMERICAN FOREST SOILS CONF PROC:283-313 PAPER NO. 479	LOGGING SYSTEM	FORESTED	X	-	-	-	-	X	-
GLENN, BRUCE P. 1970 A GUIDE TO USING INTEREST FACTORS IN ECONOMIC ANALYSIS OF WATER PROJECTS USDI BUREAU OF RECLAMATION (DECEMBER) GPO 832-593 PAPER NO. 443	GENERAL PAPER	-	-	-	-	-	-	-	B,C,B/C,IRR
HINOMOTO, HIROHIDE 1971 UNIT & TOTAL COST FUNCTIONS FOR WATER TREATMENT BASED ON KOENIG'S DATA WATER RESOURCES RESEARCH 7(5):1064-1069 PAPER NO. 444	GENERAL	-	X	-	-	X	X	-	C
JOHNSON, R. ROY (ED) JONES, DALE A. (ED) 1977 IMPORTANCE, PRESERVATION AND MANAGEMENT OF RIPARIAN HABITAT: A SYMPOSIUM USFS RM-43 GENERAL TECHNICAL REPORT PAPER NO. 731	GENERAL WATERSHED MGMT	RIPARIAN	X	-	-	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 5, 6 AND 10

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
LIACOS, LEONIDAS G. 1962 WATER YIELD AS INFLUENCED BY DEGREE OF GRAZING IN CALIFORNIA WINTER GRASSLANDS JOURNAL OF RANGE MANAGEMENT 15:34-42 PAPER NO. 415	GRAZING SYSTEM	-	-	X	-	-	-	-	-
MERCER, LLOYD J. MORGAN, W. DOUGLAS 1986 THE EFFICIENCY OF WATER PRICING: A RATE OF RETURN ANALYSIS FOR MUNICIPAL WATER WATER RESOURCES BULLETIN 22(2):289-295 PAPER NO. 438	GENERAL PAPER	MUNICIPAL	-	-	-	-	X	-	B,C,B/C,IRR
MEYER, P. ET AL 1985 CALCULATION OF ENVIRON COSTS/BENEFITS ASSOCIATED WITH HYDROPOWER DEVEL IN PNW BONNEVILLE POWER ADMIN, OFFICE OF ENVIRONMENTAL ANALYSIS, PORTLAND, OREGON PAPER NO. 753	MULTIPLE	-	X	X	X	-	-	-	-
NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OF SCIENCES 1984 ECONOMIC FEASIBILITY AND PUBLIC RANGE INVESTMENT DEVELOPING STRATEGIES FOR RANGELAND MGMT, WESTVIEW PRESS, BOULDER, CO, 1984 PAPER NO. 375	GENERAL PAPER	ALL	X	X	-	-	-	-	B,C,B/C,IRR
SCHULTZ, BOB PLUMAS NATIONAL FOREST 1987 POCO CREEK RESTORATION PROJECT: BECKWOURTH RANGER DISTRICT USFS PLUMAS NATIONAL FOREST PAPER NO. 715	HABITAT IMPROVEMENT	-	X	-	-	-	-	-	B,C,B/C

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 5, 6 AND 10

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
SHERWOOD-CALL, CAROLYN		1987							
IRRIGATION AND WATER QUALITY									
FEDERAL RESERVE BANK SAN FRANCISCO WEEKLY LETTER (JANUARY 2)									
PAPER NO. 450	-	-	X	-	-	-	X	-	B,C
SKOVLIN, JON M.		1984							
IMPACTS OF GRAZING ON WETLANDS & RIPARIAN HABITAT: A REVIEW OF OUR KNOWLEDGE									
DEVELOPING STRATEGIES FOR RNGLD MGT, WESTVIEW PRESS, BOULDER CO 1984:1001-1103									
PAPER NO. 532	GRAZING	RIPARIAN	X	-	-	-	-	-	B
SMITH, V. KERRY	ET AL	1983							
ESTIMATING WATER QUALITY BENEFITS: AN ECONOMETRIC ANALYSIS									
SOUTHERN ECONOMIC JOURNAL:50(2):422-437									
PAPER NO. 440	RECREATION	-	X	-	-	X	X	X	B,C
SULLIVAN, KATHLEEN		1985							
LONG-TERM PATTERN OF WTR QUAL IN MANAGED WATERSHED IN OR: 1. SUSPEND SEDIMENT									
WATER RESOURCES BULLETIN 21(6):977-987									
PAPER NO. 477	LOGGING SYSTEM	FORESTED	X	-	-	-	-	-	-
TROENDLE, CHARLES A.	LEAF, CHARLES F.	UNKWN							
HYDROLOGY, CHAPTER III									
AN APPROACH TO WATER RES EVAL OF NON-POINT SILVIC SOURCES, EPA-60018-80-012									
PAPER NO. 500	LOGGING SYSTEM	FORESTED	-	X	X	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
UNGER, SAMUEL G.	ET AL	1973					
STATE-OF-ART REVIEW: WATER POLLUTION CONTROL BENEFITS AND COSTS - VOL. 1							
US ENVIRONMENTAL PROTECTION AGENCY, EPA-600/5-73-008A							
PAPER NO. 441	GENERAL PAPER		X - -	X	X	-	B,C,B/C
USDA FOREST SERVICE		1971					
EFFECT OF FOREST-MANAGEMENT PRACTICES ON NUTRIENT LOSSES							
USDA FOREST SERVICE, 1971							
PAPER NO. 453	LOGGING SYSTEM	FORESTED	X - -	-	-	-	-
WARRINGTON, GORDON E.		UNKWN					
ESTIMATING SOIL EROSION FOR FOREST LAND MANAGEMENT PLANNING: A PROCEDURE							
USFS RM, FORT COLLINS, COLORADO							
PAPER NO. 542	MULTIPLE	FORESTED	X - -	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
ANDERSON, HENRY W.	ET AL	1986							
FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY									
USFS PSW-18 GENERAL TECHNICAL REPORT									
PAPER NO. 719	GENERAL WATERSHED MGMT	-	X	X	X	-	-	-	-
ASKEW, G. R.	WILLIAMS, T. M.	1986							
WATER QUALITY CHANGES DUE TO SITE CONVERSION IN COASTAL SOUTH CAROLINA									
SOUTHERN JOURNAL OF APPLIED FORESTRY 10(1986):134-136									
PAPER NO. 528	VEGETATIVE MGMT	FORESTED	X	-	-	-	-	-	-
AUBERTIN, G. M.	PATRIC, J. H.	1974							
WATER QUALITY AFTER CLEARCUTTING A SMALL WATERSHED IN WEST VIRGINIA									
JOURNAL OF ENVIRONMENTAL QUALITY 3(3):243-249									
PAPER NO. 470	LOGGING SYSTEM	-	X	-	-	-	-	-	-
BEASLEY, R. S.	ET AL	1986							
SEDIMENT LOSS FROM FOREST MGMT: MECH VS CHEMICAL SITE PREP AFTER CLEARCUTTING									
JOURNAL OF ENVIRONMENTAL QUALITY 15(4):413-416									
PAPER NO. 458	LOGGING SYSTEM	FORESTED	X	X	-	-	-	X	-
BEASLEY, R. SCOTT	GRANILLO, ALFREDO B.	1982							
SEDIMENT LOSSES FROM FOREST PRACTICES IN THE GULF COASTAL PLAIN OF ARKANSAS									
USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:461-467									
PAPER NO. 465	LOGGING SYSTEM	FORESTED	X	-	X	-	-	X	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
BEHAN, JOHN J.	ET AL	1985							
A NET BENEFIT MODEL FOR RECREATION PLANNING AT DRINKING WATER RESERVOIRS									
WATER RESOURCES BULLETIN 21(2):297-309									
PAPER NO. 539	RECREATION	RESERVOIRS	X	-	-	-	-	-	B,C,B/C
BLACKBURN, W. H.		1983							
LIVESTOCK GRAZING IMPACTS ON WATERSHEDS									
RANGELANDS 5(3):123-125									
PAPER NO. 529	GRAZING	PLAINS GRASSLANDS	X	X	-	-	-	-	-
BLACKBURN, W. H.	ET AL	UNKWN							
FOREST HARVESTING & SITE PREP IMPACTS ON STORMFLOW & WATER QUALITY IN E. TEXAS									
FORESTRY & WATER QUALITY: MIDSOUTH SYMPOSIUM PROC, LITTLE ROCK, AK									
PAPER NO. 461	LOGGING SYSTEM	FORESTED	X	X	-	-	-	X	-
BLACKBURN, W. H.	WOOD, J. C.	UNKWN							
WATER YIELD AND QUALITY FROM UNDISTURBED FORESTED WATERSHEDS IN EAST TEXAS									
SYMPOSIUM ON WILDERNESS & NATURAL AREAS: A MANAGEMENT CHALLENGE PROC									
PAPER NO. 505	VEGETATIVE MGMT	FORESTED	X	X	-	-	-	-	-
BLACKBURN, WILBERT H.		1984							
IMPACTS OF GRAZING INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC									
DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO									
PAPER NO. 411	GRAZING SYSTEM	VARIOUS	X	X	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
BOWDEN, WILLIAM B.	BORMANN, F. H.	1986					
TRANSPORT & LOSS OF NITROUS OXIDE IN SOIL WATER AFTER FOREST CLEAR-CUTTING							
SCIENCE 233(4766):867-869							
PAPER NO. 460	LOGGING SYSTEM	FORESTED	X - -	-	-	-	-
BROCK, J. H.	ET AL	1982					
INFILTRATION & SEDIMENT PRODUCTION ON DEEP HARDLAND RANGE SITE IN N. CEN TX							
JOURNAL OF RANGE MANAGEMENT 35(2):195-198							
PAPER NO. 323	RANGE REHABILITATION	PLAINS GRASSLANDS	X - -	-	-	-	-
BROOKSHIRE, DAVID S.	ET AL	1986					
EXISTENCE VALUES & NORMATIVE ECONOMICS: IMPLICATION FOR VALUING WATER RESOURCE							
WATER RESOURCES RESEARCH 22(11):1509-1518							
PAPER NO. 437	GENERAL PAPER	-	- - -	-	-	-	B,C
CLARK, EDWIN H. II		1985					
THE OFF-SITE COSTS OF SOIL EROSION							
JOURNAL OF SOIL AND WATER CONSERVATION 40(1):19-22							
PAPER NO. 447	GENERAL PAPER	-	X - -	X	X	-	C
CLARK, ROBERT M.	ET AL	1984					
COST AND BENEFITS OF DRINKING WATER TREATMENT							
JOURNAL OF ENVIRONMENTAL SYSTEMS 14(1):1-29							
PAPER NO. 432	GENERAL PAPER	-	X - -	X	X	X	B,C

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
CORBETT, EDWARD S. 1984 MUNICIPAL WATERSHED CONCERNS IN: FORESTRY MGT & WATER QUALITY: PROC 1984 PA STATE FOR ISSUES CONF:120-127 PAPER NO. 425	GENERAL	MUNICIPAL WATERSHED	X	X	-	-	-	-	-
CORBETT, EDWARD S. LYNCH, JAMES A. 1985 MANAGEMENT OF STREAMSIDE ZONES ON MUNICIPAL WATERSHEDS USPS RM-120 GENERAL TECHNICAL REPORT PAPER NO. 424	VEGETATIVE MGMT	RIPARIAN	X	X	-	-	-	-	-
CROKE, KEVIN ET AL 1986 ESTIMATING THE VALUE OF IMPROVED WATER QUALITY IN AN URBAN RIVER SYSTEM JOURNAL OF ENVIRONMENTAL SYSTEMS 16(1):13-24 PAPER NO. 439	GENERAL PAPER	URBAN RIVER	X	-	-	-	X	X	B
DICKERSON, B. P. 1974 STORMFLOWS AND EROSION AFTER TREE-LENGTH SKIDDING ON COASTAL PLAIN SOILS AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS, PAPER #74-2558 PAPER NO. 471	LOGGING SYSTEM	FORESTED	X	-	-	-	-	-	-
DISSMEYER, GEORGE E. STUMP, RICHARD F. 1978 PREDICTED EROSION RATES FOR FOREST MGMT ACTIVITIES & CONDITIONS SAMPLED IN SE USFS STATE & PRIVATE FORESTRY, SE AREA PAPER NO. 456	LOGGING SYSTEM	-	X	-	-	-	-	X	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
DISSMEYER, GEORGE E.		1981							
DEVELOPING A USLE COVER-MANAGEMENT (C) FACTOR PROCEDURE FOR FOREST CONDITIONS									
USDA ARS WORKSHOP ON ESTIM EROSION & SED YLD ON RNGLNDS PROC, ARM-W-26:166-186									
PAPER NO. 728	GENERAL WATERSHED MGMT	FORESTED	-	-	-	-	-	-	-
DISSMEYER, GEORGE E.	ET AL	UNKWN							
SUMMARY OF MUNICIPAL WATERSHED MANAGEMENT SURVEYS IN THE EASTERN UNITED STATES									
USFS NE-13 GENERAL TECHNICAL REPORT									
PAPER NO. 428	GENERAL PAPER	MUNICIPAL WATERSHED	X	-	-	-	-	-	-
DOUGLASS, JAMES E.		1974							
WATERSHED VALUES - IMPORTANT IN LAND USE PLANNING ON SOUTHERN FORESTS									
JOURNAL OF FORESTRY 72(10):617-621									
PAPER NO. 502	VEGETATIVE MGMT	FORESTED	X	X	X	X	X	X	C
DOUGLASS, JAMES E.		1979							
SILVICULTURE FOR WATER YIELD									
TOWN MEETING FORESTRY - ISSUES FOR THE 1980'S, NATL CONV SOC AM FOR PROC:90-96									
PAPER NO. 503	VEGETATIVE MGMT	FORESTED	-	X	-	-	-	-	-
DOUGLASS, JAMES E.	ET AL	1982							
STORMFLOW CHANGES AFTER PRESCRIBED BURNING & CLEARCUTTING PINE STANDS IN SC									
USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:454-460									
PAPER NO. 508	LOGGING SYSTEM	FORESTED	-	X	X	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 8 AND 9

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
DOUGLASS, JAMES E. 1983 POTENTIAL FOR WATER YIELD AUGMENTATION FROM FOREST MGMT IN THE EAST U.S. WATER RESOURCES BULLETIN 19(3):351-358 PAPER NO. 504	VEGETATIVE MGMT	FORESTED	-	X	-	-	-	-	-
ELLEFSON, PAUL V. MILES, PATRICK D. 1985 PROTECTING WATER QUALITY IN THE MIDWEST: IMPACT ON TIMBER HARVESTING COSTS NORTHERN JOURANL OF APPLIED FORESTRY 2(1985):57-61 PAPER NO. 433	-	FORESTED	X	-	-	-	X	-	B,C
FRAAS, ARTHUR G. MUNLEY, VINCENT G. 1984 MUNICIPAL WASTEWATER TREATMENT COST JOURNAL OF ENVIRONMENTAL ECONOMICS AND MANAGEMENT 11(1984):28-38 PAPER NO. 448	GENERAL PAPER	-	X	-	-	-	-	-	C
GLENN, BRUCE P. 1970 A GUIDE TO USING INTEREST FACTORS IN ECONOMIC ANALYSIS OF WATER PROJECTS USDI BUREAU OF RECLAMATION (DECEMBER) GPO 832-593 PAPER NO. 443	GENERAL PAPER	-	-	-	-	-	-	-	B,C,B/C,IRR
GOLDEN, MICHAEL S. ET AL 1984 FORESTRY ACTIVITIES & WATER QUALITY IN ALABAMA: EFFECTS, RECOMMENDED PRACTICES ALABAMA AGRICULTURAL EXPERIMENT STATION, AUBURN UNIV, AL, BULLETIN 555 PAPER NO. 452	MULTIPLE	-	X	-	-	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 8 AND 9

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
HINOMOTO, HIROHIDE		1971							
UNIT & TOTAL COST FUNCTIONS FOR WATER TREATMENT BASED ON KOENIG'S DATA									
WATER RESOURCES RESEARCH 7(5):1064-1069									
PAPER NO. 444	GENERAL	-	X	-	-	X	X	-	C
HOLLIS, CHARLES A.	ET AL	1978							
EFFECTS OF SOME SILVIC PRACTICES ON SOIL-SITE PROPERTIES IN LOWER COAST PLAINS									
5TH NORTH AMERICAN FOREST SOILS CONF PROC:585-606									
PAPER NO. 468	LOGGING SYSTEM	FORESTED	X	-	-	-	-	-	-
HORNBECK, J. W.	ET AL	1973							
STRIP CUT AS MEANS OF PROTECT SITE & STREAMFLOW QUAL WHEN CLEARCUT N. HARDWOOD									
4TH NORTH AMERICAN FOREST SOILS CONF PROC:209-225									
PAPER NO. 463	LOGGING SYSTEM	FORESTED	X	X	-	-	-	X	-
HUFF, D. D.	ET AL	1978							
ELEMENT CYCLES & WATER BUDGET ANALYSES APPLIED TO FOREST MGMT IN EAST U.S.									
SOCIETY OF AMERICAN FORESTERS PROC:77-89									
PAPER NO. 501	VEGETATIVE MGMT	FORESTED	X	X	-	-	-	-	-
HURON-MANISTEE NAT'L FORE		1985							
FOREST REPORT									
USFS REGION 9									
PAPER NO. 683	FOREST REPORT	-	X	-	-	-	-	-	B,C

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
KOCHENDERFER, J. N. HELVEY, J. D. 1982 PROGRESS REPORT I - SOIL LOSS & UTILITY EVALUATION OP POREST ACCESS ROAD IN WV USFS NE 4300-PS-NE-1602-45 PAPER NO. 546	ROADS	FORESTED	X - -	-	-	-	-
LEONARD, R. A. ET AL 1979 HERBICIDE RUNOPP FROM UPLAND PIEDMONT WATERSHEDS - DATA & IMPLICATIONS... JOURNAL OP ENVIRONMENTAL QUALITY 8(2):223-230 PAPER NO. 527	VEGETATIVE MGMT	-	X - -	-	-	-	-
LULL, HOWARD W. REINHART, KENNETH G. 1972 FORESTS AND FLOODS IN THE EASTERN UNITED STATES USPS NE-226 RESEARCH PAPER PAPER NO. 429	GENERAL PAPER	-	- - -	-	-	-	-
LYNCH, JAMES A. CORBETT, EDWARD S. 1981 EFPECTIVENESS OF BEST MANAGEMENT PRACTICES IN CONTROLLING NONPOINT POLLUTION NONPT POLLUT-TOOLS & TECH POR FUTURE, INTERSTATE COMM ON POTOMAC RIVER BASIN PAPER NO. 454	LOGGING SYSTEM	FORESTED	X X -	-	-	X	-
LYNCH, JAMES A. ET AL 1985 BEST MGMT PRACTICES POR CONTROL NONPT-SOURCE POLLUTION ON FORESTED WATERSHEDS JOURNAL OP SOIL AND WATER CONSERVATION 40(1):164-167 PAPER NO. 455	-	FORESTED	X - -	-	-	X	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
MCMINN, JAMES W.	HEWLETT, JOHN D.	1975							
FIRST-YEAR WATER YIELD INCREASE AFTER FOREST CUTTING: AN ALTERNATIVE MODEL									
JOURNAL OF FORESTRY (OCTOBER 1975):654-655									
PAPER NO. 506	VEGETATIVE MGMT	FORESTED	-	X	-	-	-	-	-
MILES, PATRICK D.		1983							
ASSESS ECON IMPLICATIONS OF MANAGING NONPT FORESTRY SOURCE OF WATER POLLUTANTS									
MASTER OF SCIENCE DEGREE, COLLEGE OF FORESTRY, UNIV OF MINNESOTA (OCTOBER)									
PAPER NO. 449	MULTIPLE	-	X	-	-	X	X	X	B,C,B/C
NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OF SCIENCES		1984							
ECONOMIC FEASIBILITY AND PUBLIC RANGE INVESTMENT									
DEVELOPING STRATEGIES FOR RANGELAND MGMT, WESTVIEW PRESS, BOULDER, CO, 1984									
PAPER NO. 375	GENERAL PAPER	ALL	X	X	-	-	-	-	B,C,B/C,IRR
NEARY, D. G.	ET AL	1986							
WATER QUAL EPHEMERAL FOREST STREAMS AFTER SITE PREP WITH HERBICIDE HEXAZINONE									
FOREST ECOLOGY AND MANAGEMENT 14(1):23-40									
PAPER NO. 459	LOGGING SYSTEM	FORESTED	X	-	-	-	-	-	-
NEARY, DANIEL G.	CURRIER, JOHN B.	1982							
IMPACT WILDFIRE/WATERSHD RESTORE ON WATER QUAL:S CAROLINA BLUE RIDGE MOUNTAINS									
SOUTHERN JOURNAL OF APPLIED FORESTRY 6(2):81-90									
PAPER NO. 462	VEGETATIVE MGMT	FORESTED	X	-	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
OBERTS, GARY L.		1986							
POLLUTANTS ASSOCIATED WITH SAND AND SALT APPLIED TO ROADS IN MINNESOTA									
WATER RESOURCES BULLETIN 22(3):479-483									
PAPER NO. 547	ROADS		X	-	-	-	-	-	-
POWELL, JEFF	ET AL	1983							
RANGELAND WATERSHED WATER BUDGET AND GRAZING CATTLE WASTE NUTRIENT CYCLING									
US ENVIRONMENTAL PROTECTION AGENCY, EPA-600/S2-83-017									
PAPER NO. 409	GRAZING SYSTEM	TALLGRASS PRAIRIE	X	-	-	-	-	-	-
RIEKERK, H.	ET AL	1980							
RESEARCH ON ENVIRON & SITE EFFECT OF FOREST MGMT PRACT IN LOWER COASTAL PLAIN									
USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:331-338									
PAPER NO. 464	LOGGING SYSTEM	FORESTED	X	-	-	-	-	-	-
SMITH, V. KERRY	ET AL	1983							
ESTIMATING WATER QUALITY BENEFITS: AN ECONOMETRIC ANALYSIS									
SOUTHERN ECONOMIC JOURNAL:50(2):422-437									
PAPER NO. 440	RECREATION		X	-	-	X	X	X	B,C
STONE, E. L.	ET AL	1978							
IMPACT OF TIMBER HARVEST/REGEN SYS ON STREAM FLOW & SOIL IN EAST DECIDUOUS REG									
5TH NORTH AMERICAN FOREST SOILS CONF PROC:516-535									
PAPER NO. 469	VEGETATIVE MGMT	FORESTED	-	-	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
STORMER, FRED A.	GUTHERY, FRED S.	1982							
IRRIGATION AND WILDLIFE IN THE SOUTHERN AND CENTRAL GREAT PLAINS									
1982 ANNUAL MEETING, GREAT PLAINS AGRICULTURAL COUNCIL, NORTH PLATTE, NE:41-48									
PAPER NO. 349	-	-	-	-	-	-	-	-	-
SWIFT, L. W., JR.		1982							
GRAVEL AND GRASS SURFACING REDUCES SOIL LOSS FROM MOUNTAIN ROADS									
USFS SE, COWEETA HYDROLOGIC LAB									
PAPER NO. 544	ROADS	-	X	-	-	-	-	-	-
SWINDEL, BENEE F.	ET AL	1983							
MULTI-RESOURCE EFFECTS OF HARVEST, SITE PREPARATION & PLANTING IN PINE FLATWDS									
SOUTHERN JOURNAL OF APPLIED FORESTRY 7(1):6-15									
PAPER NO. 355	VEGETATIVE MGMT	-	X	X	-	-	-	-	-
TRIMBLE, GEORGE R., JR.	WEITZMAN, SIDNEY	1953							
SOIL EROSION ON LOGGING ROADS									
SOIL SCIENCE SOCIETY PROC:152-154									
PAPER NO. 543	ROADS	-	X	-	-	-	-	-	-
TROENDLE, CHARLES A.	LEAF, CHARLES F.	UNKWN							
HYDROLOGY, CHAPTER III									
AN APPROACH TO WATER RES EVAL OF NON-POINT SILVIC SOURCES, EPA-60018-80-012									
PAPER NO. 500	LOGGING SYSTEM	FORESTED	-	X	X	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
UNGER, SAMUEL G.	ET AL	1973							
STATE-OF-ART REVIEW: WATER POLLUTION CONTROL BENEFITS AND COSTS - VOL. 1									
US ENVIRONMENTAL PROTECTION AGENCY, EPA-600/5-73-008A									
PAPER NO. 441	GENERAL PAPER	-	X	-	-	X	X	-	B,C,B/C
URSIC, S. J.		1984							
HYDROLOGIC EFFECTS OF COMPLETE & CONVENTIONAL HARVEST OF LOBLOLLY PINE BIOMASS									
USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:565-572									
PAPER NO. 467	LOGGING SYSTEM	FORESTED	X	-	-	-	-	-	-
USDA	KENTUCKY NATURAL RESOURCE	1985							
SOURCE DISTRIBUTION OF SEDIMENT BY FIRST APPROXIMATION OF SUSPENDED SEDIMENT									
KENTUCKY SPECIAL RESOURCE STUDY REPORT									
PAPER NO. 721	GENERAL WATERSHED MGMT	WATERSHED	X	-	-	-	-	-	-
USDA FOREST SERVICE		1971							
EFFECT OF FOREST-MANAGEMENT PRACTICES ON NUTRIENT LOSSES									
USDA FOREST SERVICE, 1971									
PAPER NO. 453	LOGGING SYSTEM	FORESTED	X	-	-	-	-	-	-
USDA FOREST SERVICE		1975							
MUNICIPAL WATERSHED MANAGEMENT SYMPOSIUM PROCEEDINGS (ENTIRE)									
USFS NE-13 GENERAL TECHNICAL REPORT									
PAPER NO. 430	GENERAL PAPER	MUNICIPAL WATERSHED	X	X	X	-	-	-	-

ENHANCED WATER MODEL - CITATIONS FOR REGIONS 8 AND 9

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
USFS NORTHEASTERN EXP STA		1986							
FOREST REPORT									
USFS NE FOREST EXPERIMENT STATION									
PAPER NO. 702	FOREST REPORT	WATERSHED	X	X	-	-	-	-	B,C,B/C
USFS SE FOREST EXP STA		UNKWN							
WATER YIELD STUDIES AT COWETTA HYDROLOGIC LABORATORY									
USFS SE FOREST EXPERIMENT STATION									
PAPER NO. 507	VEGETATIVE MGMT	FORESTED	-	X	X	-	-	-	-
VARIOUS		1986							
FOREST REPORT									
CHATTAHOOCHEE-OCONEE NATIONAL FOREST, REGION 8									
PAPER NO. 682	FOREST REPORT	-	X	X	-	-	-	-	B,C,B/C
VERRY, ELON S.	ET AL	1983							
ASPEN CLEARCUTTING INCREASES SNOWMELT & STORM FLOW PEAKS IN N. CENTRAL MN									
WATER RESOURCES BULLETIN 19(1):59-67									
PAPER NO. 509	LOGGING SYSTEM	ASPEN	-	X	X	-	-	-	-
WORLEY, DAVID P.	PATRIC, JAMES H.	1971							
ECONOMIC EVALUATION OF SOME WATERSHED MGMT ALTERNATIVES ON FOREST LAND IN WV									
WATER RESOURCES RESEARCH 7(4):812-818									
PAPER NO. 435	VEGETATIVE MGMT	FORESTED	-	X	-	-	X	-	B,C

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
YOHO, NOEL S.		UNKWN					
FOREST MANAGEMENT AND SEDIMENT PRODUCTION IN THE SOUTH - A REVIEW							
SOUTHERN JOURNAL OF APPLIED FORESTRY:27-35							
PAPER NO. 457	LOGGING SYSTEM	FORESTED	X - -	-	-	X	-

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
BAKER, MALCHUS B., JR.		1981					
HYDROLOGIC REGIMES OF THREE VEGETATION TYPES ACROSS THE MOGOLLON RIM							
AM SOC CIVIL ENGINEERS PROC: HYDRO & WATER RES IN AZ & SW. VOL. 11:5-12							
PAPER NO. 487	VEGETATIVE MGMT	PNYN-JNPR & PONDRSA	- X -	-	-	-	-
BLOSSER, RUSSELL O.		1984					
FORESTRY MANAGEMENT PRACTICES & CUMULATIVE EFFECTS ON WATER QUALITY & UTILITY							
NATL COUNCIL OF PAPER INDUSTRY FOR AIR & STREAM IMPROV, INC, TECH BULLETIN 435							
PAPER NO. 427	GENERAL PAPER	-	X X -	-	-	-	-
BRNA, PAUL		1977					
FOREST MANAGEMENT BENEFITS VALUATION, A BIBLIOGRAPHY							
USDI, BUREAU OF LAND MANAGEMENT, TECHNICAL NOTE 302							
PAPER NO. 735	ECONOMIC ANALYSIS	-	- - -	-	-	-	B
BROZKA, ROBERT J.		1982					
EFFECTS OF TIMBER HARVESTING & ASSOC ROADS ON WATER QUALITY & MGMT PRACTICES							
NEW MEXICO SOIL & WATER CONSERVATION DIVISION, CONTRACT 70-541-60, EXHIBIT B							
PAPER NO. 550	MULTIPLE	-	X - -	X	X	X	B,C
CHAKRAVARTY, SHRI M. K.		1978					
ECONOMICS OF WATERSHED MANAGEMENT							
JOURNAL OF SOIL AND WATER CONSERVATION IN INDIA 28(1-4):69-75							
PAPER NO. 442	GENERAL PAPER	WATERSHED	- - -	-	-	-	B,C,IRR

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
CHAKRAVARTY, SHRI M. K.		1978							
ECONOMICS OF WATERSHED MANAGEMENT									
JOURNAL OF SOIL AND WATER CONSERVATION IN INDIA 28(1-4):69-75									
PAPER NO. 736	ECONOMIC ANALYSIS	-	-	-	-	-	-	-	-
DESVOUSGES, WILLIAM H. SKAHEN, VENETIA A.		1985							
TYPE B TECHNICAL INFORMATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA									
RESEARCH TRIANGLE INSTITUTE PROJECT 3142-05DR									
PAPER NO. 745	ECONOMIC ANALYSIS	-	-	-	-	-	-	-	-
DYRLAND, R. D.		UNKWN							
PRACTICAL LINKAGE OF ECONOMICS WITH HYDROLOGIC DATA & INTERPRETATIONS FOR USE									
USFS REGION 5									
PAPER NO. 738	ECONOMIC ANALYSIS	-	-	-	-	-	-	-	-
GRAY, S. L. YOUNG, R. A.		1984							
VALUATION OF WATER ON WILDLANDS									
VALUATION OF WLDLND RESOURCE BENEFITS, WESTVIEW PRESS BOULDER, CO, 1984:157-91									
PAPER NO. 436	GENERAL PAPER	WILDLAND	X	X	X	-	-	-	B,C
GREGERSEN, H. M. ET AL		1986							
GUIDELINES FOR ECONOMIC APPRAISAL OF WATERSHED MANAGEMENT PROJECTS									
PREPARED FOR THE FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS									
PAPER NO. 730	GENERAL WATERSHED MGMT		-	X	-	-	-	-	B,C,B/C

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
HARR, R. DENNIS		1983							
POTENTIAL FOR AUGMENTING WATER YIELD THROUGH FOREST PRACTICES IN W. WA/W. OR									
WATER RESOURCES BULLETIN 19(3):383-393									
PAPER NO. 499	-	-	X	X	X	-	-	-	-
LUSBY, GREGG C.		1970							
HYDROLOGIC & BIOTIC EFFECTS OF GRAZING VS. NON-GRAZING NEAR GRAND JUNCTION, CO									
JOURNAL OF RANGE MANAGEMENT 3:256-260									
PAPER NO. 416	GRAZING SYSTEM	DESERT SHRUB	X	X	-	-	-	-	-
MCDONALD, ROBERT	ET AL	1977							
SILVICULTURAL ACTIVITIES & NON-POINT POLLUTION ABATEMENT: COST-EFFECTIVENESS									
USFS, EPA-600/8-77-018									
PAPER NO. 742	ECONOMIC ANALYSIS	-	X	-	-	-	-	-	C
MEYER, G. J.	ET AL	1975							
SEDIMENT YIELDS FROM ROADSIDES: APPLICATION OF UNIVERSAL SOIL LOSS EQUATION									
JOURNAL OF SOIL AND WATER CONSERVATION (NOV-DEC 1985):289-292									
PAPER NO. 545	ROADS	-	X	-	-	-	-	-	-
PETERSON, GEORGE L. (ED)	RANDALL, ALAN (ED)	1984							
VALUATION OF WILDLAND RESOURCE BENEFITS									
WESTVIEW PRESS, INC., BOULDER, COLORADO 1984									
PAPER NO. 733	ECONOMIC ANALYSIS	-	-	-	-	-	-	-	B,C,B/C,IRR

ENHANCED WATER MODEL - CITATIONS FOR UNSPECIFIED GEOGRAPHIC REGION

CITATION	PRACTICE	RANGE	TYPE	WQ	WY	WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
SILVEY, LEE	ROSGEN, DAVE		1980							
"HYSED" A WATER RESOURCE ANALYSIS MODEL FOR FOREST LAND USE PLANNING										
USFS REGION 2										
PAPER NO. 732	GENERAL WATERSHED MGMT	-		-	-	-	-	-	-	-
STONE, EARL			1977							
THE IMPACT OF TIMBER HARVEST ON SOILS AND WATER										
USFS REPORT OF THE PRESIDENT'S ADVISORY ON TIMBER & THE ENVIRONMENT, APR 1973										
PAPER NO. 497	LOGGING SYSTEM	-		X	X	X	-	-	-	C
USDA SOIL CONS SERVICE			1964							
ECONOMICS GUIDE FOR WATERSHED PROTECTION AND FLOOD PREVENTION										
USDA SOIL CONSERVATION SERVICE										
PAPER NO. 744	ECONOMIC ANALYSIS	-		-	-	-	-	-	-	B,C
USFS			1983							
1985 RPA - WATER BENEFIT VALUES AND PROCEDURES										
COPIES AVAILABLE UPON REQUEST										
PAPER NO. 451	MULTIPLE	-		X	-	-	-	-	-	B,C
WELLS, CAROL G.	ET AL		1978							
EFFECTS OF FIRE ON SOIL, A STATE-OF-KNOWLEDGE REVIEW										
USFS WO-7 GENERAL TECHNICAL REPORT										
PAPER NO. 729	GENERAL WATERSHED MGMT	-		-	-	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ WY WT	CONVERSION RELATIONS	COST OR VALUE	SAVINGS INCREMENT	ECONOMICS
WILLIAMS, THOMAS M.	ASKEW, GEORGE R.	1984					
WATER QUALITY CHANGES ASSOCIATED WITH FOREST DRAINAGE & PINE PLANTATION ESTAB							
USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:536-549							
PAPER NO. 466	VEGETATIVE MGMT	FORESTED	X - -	-	-	-	-
WOOD, M. KARL	BLACKBURN, WILBERT H.	1981					
GRAZING SYSTEMS: THEIR INFLUENCE ON INFILTRATION RATES IN ROLLING PLAINS OF TX							
JOURNAL OF RANGE MANAGEMENT 34(4):331-335							
PAPER NO. 418	GRAZING SYSTEM	-	- X -	-	-	-	-

CITATIONS FOR FISHERIES MODEL

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
BROWN, WILLIAM G. 1964 MEASUR RECREATION BENEFIT FROM NATURAL RES-PARTICULAR REFER TO SALMON...OREGON COMMITTEE ON ECON OF RNG USE & DEVELOP OF W AGRIC ECON RESEARCH COUNCIL RPT 6 PAPER NO. 645	INSTREAM FLOW NEEDS	RIVER	- - - -		-	-	X ..	B,C
CHAMBERLIN, T. W. 1982 INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N. AMERICA: TIMBER HARVEST USFS PNW-136 GENERAL TECHNICAL REPORT PAPER NO. 569	LOGGING SYSTEM	STREAM	X X X X	E C	-	-	-	-
CLAIRE, ERROL W. STORCH, ROBERT L. 1977 STREAMSIDE MGMT & LIVESTOCK GRAZING IN BLUE MOUNTAINS OF OREGON: A CASE STUDY WORKSHOP: LIVESTOCK/WILDLIFE-FISH RELATIONSHIPS IN GREAT BASIN PROC:111-128 PAPER NO. 626	RANGE MANAGEMENT	RIPARIAN	- - - -		-	-	-	-
CLARK, ROGER N. ET AL 1985 INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N. AMERICA: INFLU OF RECREATION USFS PNW-178 GENERAL TECHNICAL REPORT PAPER NO. 574	RECREATION	RIPARIAN & AQUATIC	X - - X		-	-	-	-
DUNCAN, S. H. WARD, J. W. 1985 INFLUENCE WATERSHED GEOLOGY/FOREST ROADS ON COMPOSITION SALMON SPAWNING GROUND NORTHWEST SCIENCE 59(3):204-212 PAPER NO. 624	ROADS	STREAM	X - - X		-	-	-	-

FISHERIES MODEL - CITATIONS FOR ANADROMOUS SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
EVEREST, FRED H. HARR, R. DENNIS 1982 INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N. AMERICA: SILVIC TREATMENTS USFS PNW-134 GENERAL TECHNICAL REPORT PAPER NO. 571	MULTIPLE	STREAM	X	X	X	X	E	C		-	-	-	-
GIBBONS, DAVE R. SALO, ERNEST O. 1973 AN ANNOTATED BIBLIOGRAPHY OF EFFECTS OF LOGGING ON FISH OF WESTERN US & CANADA USFS PNW-10 GENERAL TECHNICAL REPORT PAPER NO. 567	MULTIPLE	STREAM	X	-	-	X	E	C	B	X	X	-	-
GILLICK, THOMAS SCOTT, BILLY DEAN 1975 BUFFER STRIPS AND THE PROTECTION OF FISHERY RESOURCES: AN ECONOMIC ANALYSIS STATE OF WASHINGTON, DEPT OF NATURAL RESOURCES, DNR REPORT 32 PAPER NO. 580	LOGGING SYSTEM	STREAM	X	-	-	X				X	X	-	B,C,B/C
GOVER, W. C. 1967 MANAGEMENT NOTES - MY RANGE USE AFFECTS SALMON AND STEELHEAD PRODUCTION JOURNAL OF RANGE MANAGEMENT 20(4):263-265 PAPER NO. 642	RANGE MANAGEMENT	STREAM	-	-	-	X				-	X	X	B,C
HALL, JAMES D. BAKER, CALVIN O. 1982 INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N AMER: REHAB STRM HABITAT-PT 1 USFS PNW-138 GENERAL TECHNICAL REPORT PAPER NO. 575	STREAM IMPROVEMENT	STREAM	X	-	X	-	E	C		-	-	-	-

FISHERIES MODEL - CITATIONS FOR ANADROMOUS SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
HELLER, DAVID A.	ET AL	1983						
MODELING THE EFFECTS OF FOREST MANAGEMENT ON SALMONID HABITAT								
USFS PNW, SIUSLAW NATIONAL FOREST								
PAPER NO. 615	MULTIPLE	-	X - - X		-	-	-	B
HIAWATHA NATIONAL FOREST		1987						
FOREST REPORT								
USFS REGION 9								
PAPER NO. 687	FOREST REPORT	-	- - - -		X	X	-	B,C,B/C
HUPPERT, DANIEL D.	ET AL	1985						
INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N. AMER: ECONOMIC CONSIDERATIONS								
USFS PNW-181 GENERAL TECHNICAL REPORT								
PAPER NO. 577	MULTIPLE	RIPARIAN & AQUATIC	- - - X		X	X	-	B,C,B/C
MIH, WALTER C.	BAILEY, GARY C.	1979						
A MACHINE FOR MITIGATION OF SALMONID SPAWNING HABITAT FROM SILTING								
USFS RM-65 GENERAL TECHNICAL REPORT:645-648								
PAPER NO. 579	STREAM IMPROVEMENT	STREAM	X - - X	E	-	-	-	-
NORRIS, L. A.	ET AL	1983						
INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N. AMERICA: FOREST CHEMICALS								
USFS PNW-149 GENERAL TECHNICAL REPORT								
PAPER NO. 573	MULTIPLE	STREAM	X - - X		-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
PLATTS, WILLIAM S. 1981													
INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N AMER: EFFECT LIVESTOCK GRAZING													
USFS PNW-124 GENERAL TECHNICAL REPORT													
PAPER NO. 572	RANGE MANAGEMENT	STREAM	X	X	X	-				-	X	-	-
REEVES, GORDON H. ROELOFS, TERRY D. 1982													
INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N AMER: REHAB STRM HABITAT-PT 2													
USFS PNW-140 GENERAL TECHNICAL REPORT													
PAPER NO. 576	STREAM IMPROVEMENT	STREAM	X	-	-	X				-	-	-	-
REID, LESLIE M. DUNNE, THOMAS 1984													
SEDIMENT PRODUCTION FROM FOREST ROAD SURFACES													
WATER RESOURCES RESEARCH 20(11):1753-1761													
PAPER NO. 623	ROADS	STREAM	X	-	-	X				-	-	-	-
REISER, D. W. BJORNN, T. C. 1979													
INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N. AMERICA: HABITAT REQUIREMENTS													
USFS PNW-96 GENERAL TECHNICAL REPORT													
PAPER NO. 568	MULTIPLE	STREAM	X	-	X	X	E	C		-	-	-	-
ROBISON, M. HENRY HORMAECHEA, DANIEL T. 1986													
POTENTIAL EMPLOYMENT IMPACT OF ANADROMOUS FISH HABITAT MGT ON PAYETTE NATL FOR													
USFS PAYETTE NATIONAL FOREST, MCCALL, IDAHO													
PAPER NO. 566	MULTIPLE	RIVER	-	-	-	X				-	-	X	B,C

FISHERIES MODEL - CITATIONS FOR ANADROMOUS SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
SEDELL, JAMES R.	DUVAL, WAYNE S.	1985									
INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N AM-WATER TRANSPRT/STORAGE LOGS											
USFS PNW-186 GENERAL TECHNICAL REPORT											
PAPER NO. 570	LOGGING SYSTEM	-	-	-	-	X	E	-	-	-	-
STOWELL, RICK	ET AL	1983									
GUIDE FOR PREDICT SALMONID RESPONSE TO SEDIMENT YLD IN ID BATHOLITH WATERSHEDS											
USFS NORTHERN REGION AND INTERMOUNTAIN REGION, WILDLIFE MANAGEMENT											
PAPER NO. 583	GENERAL	STREAM	X	-	-	X	E	X	-	-	-
WARNER, ANNE L.		1985									
EQUITY OF DISTRIB OF COSTS & BENEFITS IN NEW ENGLAND ANADROMOUS FISH PROGRAM											
AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:127-132											
PAPER NO. 578	STREAM IMPROVEMENT	RIVER	-	-	-	X		-	-	X	B,C

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
AMERICAN FISHERIES SOC 1982 MONETARY VALUES OP PRESHWATER PISH AND FISH-KILL COUNTING GUIDELINES AMERICAN FISHERIES SOCIETY, SPECIAL PUBLICATION 13 PAPER NO. 646	GENERAL	STREAM	-	-	-	-				-	-	X	B
BROWN, GEORGE W. KRYGIER, JAMES T. 1970 EFFECTS OP CLEAR-CUTTING ON STREAM TEMPERATURE WATER RESOURCES RESEARCH 6(4):1133-1139 PAPER NO. 556	LOGGING SYSTEM	STREAM	X	-	-	X				-	-	-	-
BRYANT, MASON D. 1985 CHANGES 30 YEARS APTER LOGGING IN LARGE WOODY DEBRIS, AND ITS USE BY SALMONIDS USFS RM-120 GENERAL TECHNICAL REPORT:329-334 PAPER NO. 557	LOGGING SYSTEM	RIPARIAN	X	-	-	X		C		-	-	-	-
BURNS, DAVID C. EDWARDS, RICHARD E. 1985 EMBEDDEDNESS OF SALMONID HABITAT OP SELECTED STREAMS ON PAYETTE NAT'L FOREST PAYETTE NATIONAL FOREST, DRAPT PAPER NO. 614	-	STREAM	X	-	-	X				-	-	-	-
DUFF, DONALD A. ET AL 1986 INDEXED BIBLIOGRAPHY ON STREAM HABITAT IMPROVEMENT USFS INTERMOUNTAIN REGION, WILDLIFE MANAGEMENT STAFF PAPER NO. 608	STREAM IMPROVEMENT	STREAM	X	-	-	X				-	-	-	-

FISHERIES MODEL - CITATIONS FOR SALMON SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
ESTES, CHRISTOPHER C.	ORSBORN, JOHN F.	1986											
REVIEW & ANALYSIS OF METHODS FOR QUANTIFYING INSTREAM FLOW REQUIREMENTS													
WATER RESOURCES BULLETIN 22(3):389-398													
PAPER NO. 562	INSTREAM FLOW NEEDS	STREAM	-	-	-	X	E			-	-	-	-
FAUSCH, KURT D.	PARSONS, MIT G.	1985											
MODELS THAT PREDICT STANDING CROP OF STREAM FISH FROM HABITAT VARIABLES													
UNPUBLISHED													
PAPER NO. 613	GENERAL PAPER	-	-	-	-	X			B	-	-	-	-
KONDOLF, G. MATHIAS	SALE, MICHAEL J.	1985											
APPLICATION OF HISTORICAL CHANNEL STABILITY ANALYSIS TO INSTREAM FLOW STUDIES													
AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:184-194													
PAPER NO. 564	INSTREAM FLOW NEEDS	RIVER	X	-	-	X				-	-	-	-
MEYER, P.	ET AL	1985											
CALCULATION OF ENVIRON COSTS/BENEFITS ASSOCIATED WITH HYDROPOWER DEVEL IN PNW													
BONNEVILLE POWER ADMIN, OFFICE OF ENVIRONMENTAL ANALYSIS, PORTLAND, OREGON													
PAPER NO. 753	MULTIPLE	-	X	X	X	X	-			-	-	-	-
MILNER, ALEXANDER M.	ET AL	1985											
INFLUENCE OF WATER TEMP & STREAMFLOW ON SOCKEYE SALMON FRY EMERGENCE/MIGRATION													
AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:54-58													
PAPER NO. 581	GENERAL	STREAM	-	-	-	X	E			-	-	-	-

FISHERIES MODEL - CITATIONS FOR SALMON SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
NELSON, W.	ET AL	1976											
ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTIC ON FISH & WILDLIFE													
US DEPT OF INTERIOR, FISH & WILDLIFE SERVICE, FWS/OBS-76/30													
PAPER NO. 558	INSTREAM FLOW NEEDS	STREAM	X	-	-	X				-	-	-	-
PLATTS, WILLIAM S.	ET AL	1983											
METHODS FOR EVALUATING STREAM, RIPARIAN, AND BIOTIC CONDITIONS													
USFS INT-138 GENERAL TECHNICAL REPORT													
PAPER NO. 601	GENERAL	RIPARIAN & STREAM	X	-	-	X				X	-	-	-
SHERIDAN, W. L.		1969											
BENEFIT/COST: SALMON HABITAT IMPROVEMENT													
USFS ALASKA REGION													
PAPER NO. 582	STREAM IMPROVEMENT	STREAM	-	-	-	-				X	X	-	B,C,B/C
SORG, CINDY F.	ET AL	1985											
NET ECONOMIC VALUE OF COLD AND WARM WATER FISHING IN IDAHO													
USFS RM-11 RESOURCE BULLETIN													
PAPER NO. 647	INSTREAM FLOW NEEDS	STREAM	-	-	-	-				-	-	-	B,C

CITATION	PRACTICE	RANGE TYPE		WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
AMERICAN FISHERIES SOC			1982											
MONETARY VALUES OF FRESHWATER FISH AND FISH-KILL COUNTING GUIDELINES														
AMERICAN FISHERIES SOCIETY, SPECIAL PUBLICATION 13														
PAPER NO. 646	GENERAL	STREAM		-	-	-	-				-	-	X	B
ANDERSON, RICHARD M.	NEHRING, R. BARRY		1985											
IMPACTS OF STREAM DISCHARGE ON TROUT REARING HABITAT/TROUT RECRUITMENT IN...CO														
AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:59-64														
PAPER NO. 592	INSTREAM FLOW NEEDS	STREAM		-	X	X	X	E			-	-	-	-
BABCOCK, WILLIAM H.			1986											
TENMILE CREEK: A STUDY OF STREAM RELOCATION														
WATER RESOURCES BULLETIN 22(3):405-415														
PAPER NO. 612	STREAM RELOCATION	STREAM		X	X	X	X				X	X	-	-
BACON, EDMOND J.			1983											
THE EFFECTS OF FOREST HARVEST ON WATER QUALITY AND AQUATIC LIFE (PHASE I)														
ARKANSAS WATER RESOURCES RESEARCH CTR, UNIV OF AR, FAYETTEVILLE, AR, A-052-ARK														
PAPER NO. 552	LOGGING SYSTEM	STREAM		X	-	-	X				X	-	-	-
BEHNKE, ROBERT J.			1977											
IMPACT OF LIVESTOCK GRAZING ON STREAM FISHERIES: PROBLEMS AND SOLUTIONS														
WORKSHOP: LIVESTOCK/WILDLIFE-FISH RELATIONSHIPS IN GREAT BASIN PROC:170-173														
PAPER NO. 628	RANGE MANAGEMENT	RIPARIAN		-	-	-	X			B	X	-	-	B,C

FISHERIES MODEL - CITATIONS FOR TROUT SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
BINNS, N. ALLEN EISERMAN, FRED M. 1979													
EVALUATION OF PLUVIAL TROUT HABITAT IN ROCKY MOUNTAIN STREAMS													
USFS RM-65 GENERAL TECHNICAL REPORT:361-364													
PAPER NO. 595	GENERAL	STREAM	-	-	-	X				-	-	-	-
BINNS, N. ALLEN 1986													
HABITAT, MACROINVERT & FISHERY RESPONSE TO STREAM IMPROVEMENT EFFORTS...IN WY													
PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:105-116													
PAPER NO. 585	STREAM IMPROVEMENT	STREAM	X	-	-	X	E			X	X	-	-
BOUSSU, MARVIN P. 1954													
RELATIONSHIP BETWEEN TROUT POPULATIONS AND COVER ON A SMALL STREAM													
JOURNAL OF WILDLIFE MANAGEMENT 18(2):229-239													
PAPER NO. 598	-	STREAM	-	-	-	X				X	X	-	-
BURNS, DAVID C. EDWARDS, RICHARD E. 1985													
EMBEDDEDNESS OF SALMONID HABITAT OF SELECTED STREAMS ON PAYETTE NAT'L FOREST													
PAYETTE NATIONAL FOREST, DRAFT													
PAPER NO. 614	-	STREAM	X	-	-	X				-	-	-	-
CAMPBELL, RONALD P. NEUNER, JEFFREY H. 1985													
SEASONAL/DIURNAL SHIFTS IN HABITAT UTILIZED BY RESIDENT RAINBOW TROUT IN W. WA													
AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:39-49													
PAPER NO. 590	INSTREAM FLOW NEEDS	STREAM	-	-	-	X				X	-	-	-

FISHERIES MODEL - CITATIONS FOR TROUT SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
CLAIRE, ERROL W. STORCH, ROBERT L. 1977													
STREAMSIDE MGMT & LIVESTOCK GRAZING IN BLUE MOUNTAINS OF OREGON: A CASE STUDY													
WORKSHOP: LIVESTOCK/WILDLIFE-FISH RELATIONSHIPS IN GREAT BASIN PROC:111-128													
PAPER NO. 626	RANGE MANAGEMENT	RIPARIAN	-	-	-	-				-	-	-	-
DAHLEM, EUGENE A. 1978													
THE MAHOGANY CREEK WATERSHED - WITH AND WITHOUT GRAZING													
FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):31-34													
PAPER NO. 588	RANGE MANAGEMENT	RIPARIAN	X	-	-	X				-	-	-	-
DUFP, DONALD A. 1977													
LIVESTOCK GRAZING IMPACTS ON AQUATIC HABITAT IN BIG CREEK, UTAH													
WORKSHOP: LIVESTOCK/WILDLIFE-PISH RELATIONSHIPS IN GREAT BASIN PROC:129-142													
PAPER NO. 637	RANGE MANAGEMENT	STREAM	X	-	-	X			B	X	-	-	-
DUFF, DONALD A. 1978													
RIPARIAN HABITAT RECOVERY ON BIG CREEK, RICH COUNTY, UTAH - SUMMARY OF 8 YRS													
FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):91-92													
PAPER NO. 630	RANGE MANAGEMENT	RIPARIAN	-	-	-	X				-	X	-	-
DUFF, DONALD A. ET AL 1986													
INDEXED BIBLIOGRAPHY ON STREAM HABITAT IMPROVEMENT													
USFS INTERMOUNTAIN REGION, WILDLIFE MANAGEMENT STAFP													
PAPER NO. 608	STREAM IMPROVEMENT	STREAM	X	-	-	X				-	-	-	-

FISHERIES MODEL - CITATIONS FOR TROUT SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
ESTES, CHRISTOPHER C. ORSBORN, JOHN F. 1986													
REVIEW & ANALYSIS OF METHODS FOR QUANTIFYING INSTREAM FLOW REQUIREMENTS													
WATER RESOURCES BULLETIN 22(3):389-398													
PAPER NO. 562	INSTREAM FLOW NEEDS	STREAM	-	-	-	X	E			-	-	-	-
FAUSCH, KURT D. PARSONS, MIT G. 1985													
MODELS THAT PREDICT STANDING CROP OF STREAM FISH FROM HABITAT VARIABLES													
UNPUBLISHED													
PAPER NO. 613	GENERAL PAPER		-	-	-	X			B	-	-	-	-
FISHER, CARLA J. ZIEBELL, CHARLES D. 1980													
EFFECTS OF WATERSHED USE ON WATER QUALITY & FISHERIES IN AN ARIZONA MTN LAKE													
EISENHOWER CONSORTIUM FOR WESTERN ENVIRONMENTAL FORESTRY RESEARCH, BULLETIN 7													
PAPER NO. 639	RANGE MANAGEMENT	LAKE	X	-	-	X				-	-	-	-
FISHLAKE NATIONAL FOREST 1987													
FOREST REPORT													
USFS REGION 4													
PAPER NO. 695	FOREST REPORT		X	X	-	-				-	-	-	-
GLOVER, RONALD D. 1986													
TROUT STREAM REHABILITATION IN THE BLACK HILLS OF SOUTH DAKOTA													
PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:7-15													
PAPER NO. 594	STREAM IMPROVEMENT	STREAM	X	-	-	X				X	X	-	-

FISHERIES MODEL - CITATIONS FOR TROUT SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
HENRY, MICHAEL H.	SARTO, GLEN DEL	1985											
COMPARE RAINBOW TROUT FISHERY IN RESPONSE TO REDUCED HIGH WNTR-SPRG STREAMFLOW													
AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:65-73													
PAPER NO. 591	INSTREAM FLOW NEEDS	STREAM	-	-	X	X				X	-	-	-
HUBERT, WAYNE A.	ET AL	1985											
GRAZING MANAGEMENT INFLUENCES ON TWO BROOK TROUT STREAMS IN WYOMING													
USFS RM-120 GENERAL TECHNICAL REPORT:290-294													
PAPER NO. 629	RANGE MANAGEMENT	STREAM	X	-	-	X			B	-	-	-	-
HUNT, ROBERT L.		1986											
EVAL OF BRUSH BUNDLES/HALF-LOGS TO ENHANCE CARRY CAPACITY OF 2 BRWN TROUT STRM													
PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:31-61													
PAPER NO. 593	STREAM IMPROVEMENT	STREAM	X	-	-	X		C	B	X	X	X	B,C
HURON-MANISTEE NAT'L FORE		1985											
FOREST REPORT													
USFS REGION 9													
PAPER NO. 683	FOREST REPORT		X	-	-	X				X	X	X	B,C
JOHNSON, R. ROY (ED)	JONES, DALE A. (ED)	1977											
IMPORTANCE, PRESERVATION AND MANAGEMENT OF RIPARIAN HABITAT: A SYMPOSIUM													
USFS RM-43 GENERAL TECHNICAL REPORT													
PAPER NO. 731	GENERAL WATERSHED MGMT	RIPARIAN	X	-	-	X				-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
KELLER, CHARLES	ET AL	1978						
FISH HABITAT CHANGES IN SUMMIT CREEK, IDAHO, AFTER FENCING THE RIPARIAN AREA								
FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):46-52								
PAPER NO. 633	RANGE MANAGEMENT	RIPARIAN	- - - X		-	X	-	-
KOBER, WAYNE W.	KEHLER, STUART E.	1986						
ANALYSIS OF DESIGN FEATURES IN MITIGATING HIGHWAY CONSTRUCT IMPACTS ON STREAMS								
PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:221-232								
PAPER NO. 619	ROADS	STREAM	- - - X		-	-	-	B,C
KONDOLF, G. MATHIAS	SALE, MICHAEL J.	1985						
APPLICATION OF HISTORICAL CHANNEL STABILITY ANALYSIS TO INSTREAM FLOW STUDIES								
AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:184-194								
PAPER NO. 564	INSTREAM FLOW NEEDS	RIVER	X - - X		-	-	-	-
LANDGRAF, KENNETH G.		1986						
LONG TERM EFFECT OF GABION STRUCTURES ON STREAMBANK STABILIZ, NORTH RIVER, VA								
PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:209-219								
PAPER NO. 587	STREAM IMPROVEMENT	STREAM	X - - X		-	-	-	-
LLOYD, JAMES R.		1986						
COWFISH HABITAT CAPABILITY MODEL								
USFS NORTHERN REGION, FISH AND WILDLIFE								
PAPER NO. 618	GENERAL	STREAM	X - - X	C	X	-	X	-

FISHERIES MODEL - CITATIONS FOR TROUT SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
LOOMIS, JOHN	ET AL	1986									
ECONOMIC LOSSES TO RECREATIONAL PISHERIES DUE TO SMALL-HEAD HYDRO-POWER DEVEL											
JOURNAL OP ENVIRONMENTAL MANAGEMENT 22:85-94											
PAPER NO. 561	INSTREAM PLOW NEEDS	STREAM	X	-	X	X		-	X	-	B,C
MACCRIMMON, HUGH R.	GOTS, BARRA L.	1986									
LAB OBSERVATIONS ON EMERGENT PATTERNS OP JUVENILE RAINBOW TROUT...											
PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:63-76											
PAPER NO. 596	-	-	X	-	-	X	E	-	-	-	-
MARCUSON, PATRICK E.		1977									
OVERGRAZED STREAMBANKS DEPRESS PISHERY PRODUCTION IN ROCK CREEK, MONTANA											
WORKSHOP: LIVESTOCK/WILDLIPE-PISH RELATIONSHIPS IN GREAT BASIN PROC:143-157											
PAPER NO. 636	RANGE MANAGEMENT	STREAM	X	-	-	X		X	X	-	-
MEYER, P.	ET AL	1985									
CALCULATION OP ENVIRON COSTS/BENEPITS ASSOCIATED WITH HYDROPOWER DEVEL IN PNW											
BONNEVILLE POWER ADMIN, OFFICE OP ENVIRONMENTAL ANALYSIS, PORTLAND, OREGON											
PAPER NO. 753	MULTIPLE	-	X	X	X	X	-	-	-	-	-
MODDE, TIMOTHY	ET AL	1986									
EFFECT OF WATERSHED ALTERATION ON BROOK TROUT POPULAT OF SM BLACK HILLS STREAM											
GREAT BASIN NATURALIST 46(1):39-45											
PAPER NO. 599	RANGE MANAGEMENT	RIPARIAN	X	-	-	X		X	-	-	-

FISHERIES MODEL - CITATIONS FOR TROUT SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
MOLLES, MANUEL C., JR. 1980 EFFECTS OF ROAD SALTING ON AQUATIC INVERTEBRATE COMMUNITIES EISENHOWER CONSORTIUM FOR WESTERN ENVIRONMENTAL FORESTRY RESEARCH, BULLETIN 10 PAPER NO. 621	ROADS	STREAM	X	-	-	X				-	-	-	-
NELSON, W. ET AL 1976 ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTIC ON FISH & WILDLIFE US DEPT OF INTERIOR, FISH & WILDLIFE SERVICE, FWS/OBS-76/30 PAPER NO. 558	INSTREAM FLOW NEEDS	STREAM	X	-	-	X				-	-	-	-
PLATTS, WILLIAM S. ET AL 1977 LIVESTOCK INTERACTIONS WITH FISH AND THEIR ENVIRONMENTS WORKSHOP: LIVESTOCK/WILDLIFE-FISH RELATIONSHIPS IN GREAT BASIN PROC:36-40 PAPER NO. 638	RANGE MANAGEMENT	RIPARIAN	-	-	-	-				-	-	-	-
PLATTS, WILLIAM S. ET AL 1983 METHODS FOR EVALUATING STREAM, RIPARIAN, AND BIOTIC CONDITIONS USFS INT-138 GENERAL TECHNICAL REPORT PAPER NO. 601	GENERAL	RIPARIAN & STREAM	X	-	-	X				X	-	-	-
RINNE, JOHN N. 1982 MOVEMENT, HOME RANGE & GROWTH OF RARE SW TROUT IN IMPROVED/UNIMPROVED HABITATS NORTH AMERICAN JOURNAL OF FISHERIES MANAGEMENT 2:150-157 PAPER NO. 597	STREAM IMPROVEMENT		-	-	-	X				-	-	-	-

FISHERIES MODEL - CITATIONS FOR TROUT SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
SHEPARD, BRADLEY B. ET AL 1984 MONITORING LEVELS OF FINE SEDIMENT WITHIN TRIBUTARIES TO FLATHEAD LAKE... PAPER PRESENTED AT WILD TROUT III SYMPOSIUM, YELLOWSTONE NATL PARK, SEPT. 1984 PAPER NO. 589	-		X	-	-	X	E	-	-	-	-
SORG, CINDY F. ET AL 1985 NET ECONOMIC VALUE OF COLD AND WARM WATER FISHING IN IDAHO USFS RM-11 RESOURCE BULLETIN PAPER NO. 647	INSTREAM FLOW NEEDS	STREAM	-	-	-	-		-	-	-	B,C
STANDAGE, RICHARD W. 1986 STREAMBANK STABILIZATION USING GEOMATRIX MATTING -- SIMPSON CREEK, VIRGINIA PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:191-198 PAPER NO. 586	STREAM IMPROVEMENT	STREAM	-	-	-	X		X	-	-	-
STUBER, ROBERT J. 1985 TROUT HABITAT, ABUNDANCE, FISHING OPPORTUNITIES IN FENCED VS UNFENCED RIPARIAN USFS RM-120 GENERAL TECHNICAL REPORT PAPER NO. 600	RANGE MANAGEMENT	RIPARIAN	X	-	-	X		X	X	-	-
TRIHEY, E. WOODY BALDRIGE, JEAN E. 1985 EMPIRICAL APPROACH FOR EVAL MICROHABITAT RESPONSE TO STREAMFLOW STEEP..STREAMS AM FISHERIES SOCIETY, SYMPOSIUM ON SMALL HYDROPOWER AND FISHERIES PROC:215-222 PAPER NO. 605	INSTREAM FLOW NEEDS	STREAM	-	-	-	X		-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
VAN VELSON, RODNEY 1978													
EFFECTS OF LIVESTOCK GRAZING UPON RAINBOW TROUT IN OTTER CREEK, NEBRASKA													
FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):53-55													
PAPER NO. 641	RANGE MANAGEMENT	STREAM	-	-	-	X		C		-	X	-	B,C

FISHERIES MODEL - CITATIONS FOR NON-THOUT AND NON-SALMON SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
AMERICAN FISHERIES SOC		1982											
MONETARY VALUES OP PRESHWATER PISH AND PISH-KILL COUNTING GUIDELINES													
AMERICAN FISHERIES SOCIETY, SPECIAL PUBLICATION 13													
PAPER NO. 646	GENERAL	STREAM	-	-	-	-				-	-	X	B
BACON, EDMOND J.		1983											
THE EFFECTS OP FOREST HARVEST ON WATER QUALITY AND AQUATIC LIFE (PHASE I)													
ARKANSAS WATER RESOURCES RESEARCH CTR, UNIV OF AR, FAYETTEVILLE, AR, A-052-ARK													
PAPER NO. 552	LOGGING SYSTEM	STREAM	X	-	-	X				X	-	-	-
BEASLEY, R. SCOTT	GRANILLO, ALFREDO B.	1982											
SEDIMENT LOSSES FROM FOREST PRACTICES IN THE GULF COASTAL PLAIN OF ARKANSAS													
USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:461-467													
PAPER NO. 465	LOGGING SYSTEM	FORESTED	X	-	X	X				-	-	-	-
CARTER, JOHN G.	ET AL	1985											
FISHERIES HABITAT DYNAMICS IN THE UPPER COLORADO RIVER													
JOURNAL OF FRESHWATER ECOLOGY 3(2):249-264													
PAPER NO. 610	INSTREAM FLOW NEEDS	RIVER	-	-	-	X				-	-	-	-
CLAIRE, ERROL W.	STORCH, ROBERT L.	1977											
STREAMSIDE MGMT & LIVESTOCK GRAZING IN BLUE MOUNTAINS OF OREGON: A CASE STUDY													
WORKSHOP: LIVESTOCK/WILDLIFE-PISH RELATIONSHIPS IN GREAT BASIN PROC:111-128													
PAPER NO. 626	RANGE MANAGEMENT	RIPARIAN	-	-	-	-				-	-	-	-

FISHERIES MODEL - CITATIONS FOR NON-TROUT AND NON-SALMON SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
DOMBECK, MICHAEL P.	ET AL	1984											
NATURAL MUSKELLUNGE REPRODUCTION IN MIDWESTERN LAKES													
IOWA AGRIC & HOME ECONOMICS EXPERIMENT STA, AMES, IOWA, JOURNAL PAPER J-I1373													
PAPER NO. 616	GENERAL	LAKE	X	-	-	X				-	-	-	-
DUFF, DONALD A.	ET AL	1986											
INDEXED BIBLIOGRAPHY ON STREAM HABITAT IMPROVEMENT													
USFS INTERMOUNTAIN REGION, WILDLIFE MANAGEMENT STAFF													
PAPER NO. 608	STREAM IMPROVEMENT	STREAM	X	-	-	X				-	-	-	-
FAUSCH, KURT D.	PARSONS, MIT G.	1985											
MODELS THAT PREDICT STANDING CROP OF STREAM FISH FROM HABITAT VARIABLES													
UNPUBLISHED													
PAPER NO. 613	GENERAL PAPER	-	-	-	-	X			B	-	-	-	-
JOHNSON, R. ROY (ED)	JONES, DALE A. (ED)	1977											
IMPORTANCE, PRESERVATION AND MANAGEMENT OF RIPARIAN HABITAT: A SYMPOSIUM													
USFS RM-43 GENERAL TECHNICAL REPORT													
PAPER NO. 731	GENERAL WATERSHED MGMT	RIPARIAN	X	-	-	X				-	-	-	-
KELLER, CHARLES	ET AL	1978											
FISH HABITAT CHANGES IN SUMMIT CREEK, IDAHO, AFTER FENCING THE RIPARIAN AREA													
FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):46-52													
PAPER NO. 633	RANGE MANAGEMENT	RIPARIAN	-	-	-	X				-	X	-	-

FISHERIES MODEL - CITATIONS FOR NON-TROUT AND NON-SALMON SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ WY WT FH	EM CC BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
KOBER, WAYNE W. KEHLER, STUART E. 1986 ANALYSIS OF DESIGN FEATURES IN MITIGATING HIGHWAY CONSTRUCT IMPACTS ON STREAMS PA FISH COMMISSION, 5TH TROUT STREAM HABITAT IMPROVEMENT WORKSHOP PROC:221-232 PAPER NO. 619	ROADS	STREAM	- - - X		-	-	-	B,C
MARCUSON, PATRICK E. 1977 OVERGRAZED STREAMBANKS DEPRESS FISHERY PRODUCTION IN ROCK CREEK, MONTANA WORKSHOP: LIVESTOCK/WILDLIFE-FISH RELATIONSHIPS IN GREAT BASIN PROC:143-157 PAPER NO. 636	RANGE MANAGEMENT	STREAM	X - - X		X	X	-	-
NELSON, W. ET AL 1976 ASSESSMENT OF EFFECTS OF ALTERED STREAM FLOW CHARACTERISTIC ON FISH & WILDLIFE US DEPT OF INTERIOR, FISH & WILDLIFE SERVICE, FWS/OBS-76/30 PAPER NO. 558	INSTREAM FLOW NEEDS	STREAM	X - - X		-	-	-	-
PLATTS, WILLIAM S. ET AL 1977 LIVESTOCK INTERACTIONS WITH FISH AND THEIR ENVIRONMENTS WORKSHOP: LIVESTOCK/WILDLIFE-FISH RELATIONSHIPS IN GREAT BASIN PROC:36-40 PAPER NO. 638	RANGE MANAGEMENT	RIPARIAN	- - - -		-	-	-	-
PLATTS, WILLIAM S. ET AL 1983 METHODS FOR EVALUATING STREAM, RIPARIAN, AND BIOTIC CONDITIONS USFS INT-138 GENERAL TECHNICAL REPORT PAPER NO. 601	GENERAL	RIPARIAN & STREAM	X - - X		X	-	-	-

FISHERIES MODEL - CITATIONS FOR NON-TROUT AND NON-SALMON SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
SORG, CINDY P.	ET AL	1985											
NET ECONOMIC VALUE OF COLD AND WARM WATER FISHING IN IDAHO													
USFS RM-11 RESOURCE BULLETIN													
PAPER NO. 647	INSTREAM FLOW NEEDS	STREAM	-	-	-	-				-	-	-	B,C

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WPUD	ECONOMICS
BROUHA, PAUL	PARSONS, MIT G.	1985											
FORESTERS ARE FISH HABITAT MANAGERS													
1985 SOCIETY OF AMERICAN FORESTERS NATIONAL CONVENTION PROC:175-178													
PAPER NO. 551	LOGGING SYSTEM	RIPARIAN	X	-	X	X					-	-	-
BURROUGHS, E. R.	ET AL	1984											
RELATIVE EFFECTIVENESS OF ROCKED ROADS AND DITCHES IN REDUCING SURFACE EROSION													
21ST ANNUAL ENGINEERING GEOLOGY & SOILS ENGINEERING SYMP PROC, U OF ID:251-263													
PAPER NO. 620	ROADS	-	X	-	-	X				-	-	-	-
CLINE, LEO D.	ET AL	1979											
THE INERTIA AND RESILIENCY OF A MOUNTAIN STREAM TO CONSTRUCTION IMPACT													
USFS RM-65 GENERAL TECHNICAL REPORT:617-620													
PAPER NO. 622	ROADS	STREAM	X	-	-	X				-	-	-	-
CLINE, RICHARD	ET AL	1981											
GUIDE FOR PREDICTING SEDIMENT YIELDS FROM FORESTED WATERSHEDS													
USFS NORTHERN REGION, INTERMOUNTAIN REGION, SOIL AND WATER MANAGEMENT													
PAPER NO. 617	MULTIPLE	FORESTED	X	-	-	X				-	-	-	-
EVANS, ELWIN D.		1979											
ESTIMATING STREAM MACROBENTHOS BENEFITS FROM LOW FLOW AUGMENTATION													
USFS RM-65 GENERAL TECHNICAL REPORT:491-495													
PAPER NO. 607	INSTREAM FLOW NEEDS	RIVER	X	-	-	X				-	-	-	-

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
FELLER, M. C.		1981											
EFFECTS OF CLEARCUTTING & SLASHBURNING ON STREAM TEMP IN SW BRITISH COLUMBIA													
WATER RESOURCES BULLETIN 17(5):863-868													
PAPER NO. 555	LOGGING SYSTEM	STREAM	X	-	-	X				-	-	-	.,-
GARY, HOWARD L.	ET AL	1983											
CATTLE GRAZING IMPACT ON SURFACE WATER QUALITY IN COLORADO FRONT RANGE STREAM													
JOURNAL OF SOIL AND WATER CONSERVATION 38(2):124-128													
PAPER NO. 640	RANGE MANAGEMENT	STREAM	X	-	-	-				-	-	-	-
GREGG, RON		1978											
A METHOD FOR ANALYZING LIVESTOCK IMPACTS ON STREAM AND RIPARIAN HABITATS													
FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):92-94													
PAPER NO. 634	RANGE MANAGEMENT	RIPARIAN	X	-	-	X				-	-	-	-
GREGORY, K. J.	ET AL	1985											
THE PERMANENCE OF DEBRIS DAMS RELATED TO RIVER CHANNEL PROCESSES													
HYDROLOGICAL SCIENCES JOURNAL 30(3):371-381													
PAPER NO. 603	-	STREAM	-	-	X	X				-	-	-	-
HEEDE, BURCHARD H.		1985											
CHANNEL ADJUSTMENTS TO THE REMOVAL OF LOG STEPS: AN EXPERIMENT IN A MTN STREAM													
ENVIRONMENTAL MANAGEMENT 9(5):427-432													
PAPER NO. 602	GENERAL	STREAM	X	-	-	X				-	-	-	-

CITATION	PRACTICE	RANGE TYPE		WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
KLOCK, G. O.			1985											
MODELING CUMULATIVE EFFECT OF FOREST PRACTICES ON DOWNSTREAM AQUATIC ECOSYSTEM														
JOURNAL OF SOIL AND WATER CONSERVATION (MARCH-APRIL):237-241														
PAPER NO. 604	MULTIPLE	STREAM		X	-	-	X				-	-	-	-
MARTIN, S. CLARK			1978											
EVALUATING IMPACT CATTLE GRAZING ON RIPARIAN HABITATS IN NATL FORESTS OF AZ/NM														
FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):35-38														
PAPER NO. 631	RANGE MANAGEMENT	RIPARIAN		-	-	-	X				-	-	-	-
MAY, BRUCE E.	DAVIS, BARRY		1981											
PRACTICES FOR LIVESTOCK GRAZING & AQUATIC HABITAT PROTECTION ON WEST RANGELAND														
U OF ID, DEPT OF WILDLIFE RES, WILDLIFE-LIVESTOCK RELATION SYMP PROC:271-278														
PAPER NO. 635	RANGE MANAGEMENT	RIPARIAN		-	-	-	X				-	-	-	-
NARAYANAN, RANGESAN			1986											
EVALUATION OF RECREATIONAL BENEFITS OF INSTREAM FLOWS														
JOURNAL OF LEISURE RESEARCH 18(2):116-128														
PAPER NO. 560	INSTREAM FLOW NEEDS	RIVER		-	X	X	X				-	-	-	B,C
OLSON, JAMES E.	HORAK, GERALD C.		1979											
SUCCESS & POTENTIAL SUCCESSFUL MEASURE TO PROTECT/IMPROVE FISH/WILDLF HABITAT														
USFS RM-65 GENERAL TECHNICAL REPORT:429-433														
PAPER NO. 644	STREAM IMPROVEMENT	STREAM		-	-	-	X				-	-	-	B,C

FISHERIES MODEL - CITATIONS FOR UNSPECIFIED FISH SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
ORSBORN, JOHN F.	ANDERSON, JOHN W.	1986											
STREAM IMPROVEMENTS AND FISH RESPONSE: A BIO-ENGINEERING ASSESSMENT													
WATER RESOURCES BULLETIN 22(3):381-388													
PAPER NO. 611	STREAM IMPROVEMENT	STREAM	-	-	-	X				-	-	-	-
ROBERTS, RICHARD G.	CHURCH, MICHAEL	1986											
SEDIMENT BUDGET IN SEVERELY DISTURBED WATERSHEDS, QUEEN CHARLOTTE RANGES, BC													
CANADIAN JOURNAL OF FOREST RESEARCH 16:1092-1106													
PAPER NO. 554	LOGGING SYSTEM	STREAM	X	-	-	X				-	-	-	-
SEDELL, JAMES R.	FROGGATT, JUDITH L.	1984											
IMPORTANCE OF STREAMSIDE FORESTS TO LARGE RIVERS: INSOLATION WILLAMETTE RVR...													
COPIES AVAILABLE UPON REQUEST													
PAPER NO. 606	-	RIVER	-	-	X	X				-	-	-	-
STORCH, ROBERT L.		1978											
LIVESTOCK/STREAMSIDE MANAGEMENT PROGRAMS IN EASTERN OREGON													
FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):56-59													
PAPER NO. 625	RANGE MANAGEMENT	RIPARIAN	-	-	-	X				-	-	-	-
VAN HAVEREN, BRUCE P.		1986											
MANAGEMENT OF INSTREAM FLOWS THROUGH RUNOFF DETENTION AND RETENTION													
WATER RESOURCES BULLETIN 22(3):399-404													
PAPER NO. 563	INSTREAM FLOW NEEDS	-	-	X	X	X				-	-	-	-

FISHERIES MODEL - CITATIONS FOR UNSPECIFIED FISH SPECIES

CITATION	PRACTICE	RANGE TYPE	WQ	WY	WT	FH	EM	CC	BM	NUMBERS/ POUNDS	INCREMENT	CONVERT TO WFUD	ECONOMICS
WARD, FRANK A.		1984											
OPTIMALLY MANAGING WILD RIVERS FOR INSTREAM BENEFITS													
1984 NATIONAL RIVER RECREATION SYMPOSIUM PROC, LA STATE UNIV:285-300													
PAPER NO. 559	INSTREAM FLOW NEEDS	RIVER	-	X	X	X				-	-	-	B,C

CITATIONS FOR FORAGE MODEL

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
ALDON, EARL F.		1980					
MICRO-CATCHMENT WATER HARVESTING							
VEG RECLAM OF MINE WASTES & TAILINGS IN SW, UNIV OF AZ-MINE RECLAMATION CENTER							
PAPER NO. 391	VEGETATIVE MGMT	DESERT GRASSLAND	-	-	-	-	-
ALLAN, J. R.	SMOLIAK, S.	1973					
MAINTAINING WATER QUALITY THROUGH CONTROL OF AQUATIC VEGETATION							
COPIES AVAILABLE UPON REQUEST							
PAPER NO. 370	WATER DEVELOPMENT	-	-	-	-	-	-
ANDERSON, HENRY W.	ET AL	1986					
FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY							
USFS PSW-18 GENERAL TECHNICAL REPORT							
PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
ARO, RICHARD S.		1971					
EVALUATION OF PINYON-JUNIPER CONVERSION TO GRASSLAND							
JOURNAL OF RANGE MANAGEMENT 24(3):188-197							
PAPER NO. 304	RANGE REHABILITATION	PINYON-JUNIPER	X	X	X	X	B,C
BLACKBURN, WILBERT H.		1984					
IMPACTS OF GRAZING INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC							
DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO							
PAPER NO. 411	GRAZING SYSTEM	VARIOUS	-	-	-	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
BROWN, THOMAS C.		1974					
CHAPARRAL CONVERSION POTENTIAL IN AZ, PART II: AN ECONOMIC ANALYSIS							
USFS RM-127 RESEARCH PAPER							
PAPER NO. 521	VEGETATIVE MGMT	CHAPARRAL	X	X	-	X	B,C,B/C
BROWN, THOMAS C.		1982					
MONETARY VALUATION OF TIMBER, FORAGE, & WATER YIELDS FROM PUBLIC FOREST LANDS							
USFS RM-95 GENERAL TECHNICAL REPORT							
PAPER NO. 734	ECONOMIC ANALYSIS	-	-	-	-	X	B,C
BUCKHOUSE, JOHN C.	GIFFORD, GERALD F.	1976					
GRAZING/DEBRIS BURN ON PINYON-JUNIPER SITES-SOME CHEM WATER QUAL IMPLICATIONS							
JOURNAL OF RANGE MANAGEMENT 29(4):299-301							
PAPER NO. 531	VEGETATIVE MGMT	PINYON-JUNIPER	-	-	-	-	-
BUCKHOUSE, JOHN C.	GIFFORD, GERALD F.	1976					
WATER QUALITY IMPLICATIONS OF CATTLE GRAZING ON SEMIARID WATERSHED IN SE UTAH							
JOURNAL OF RANGE MANAGEMENT 29(2):109-113							
PAPER NO. 534	GRAZING	PINYON-JUNIPER	-	-	-	-	-
CHRISTENSEN, M. DALE	ET AL	1974					
CONTROL OF ANNUAL GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS							
JOURNAL OF RANGE MANAGEMENT 27(2):143-145							
PAPER NO. 329	RANGE REHABILITATION	PONDEROSA PINE	X	X	-	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
CIBOLA NATIONAL FOREST	-	1980					
WASHITA PL-534 PROJECT - FLOOD PREVENTION							
USFS REGION 3							
PAPER NO. 698	FOREST REPORT	-	-	-	-	-	B,C
CLARY, WARREN P.		1964					
METHOD FOR PREDICTING POTENTIAL HERBAGE YIELD ON BEAVER CREEK PILOT WATERSHEDS							
AMERICAN SOCIETY OF AGRONOMY, ASA SPECIAL PUBLICATION 5(OCT 1964):244-250							
PAPER NO. 385	RANGE REHABILITATION	PINYON-JUNIPER	X	-	-	-	-
CLARY, WARREN P.	ET AL	1968					
RELATIONSHIP OF DIFFERENT FOREST FLOOR LAYERS TO HERBAGE PRODUCTION							
USFS RM-123 RESEARCH NOTE							
PAPER NO. 383	VEGETATIVE MGMT	PONDEROSA PINE	X	-	-	-	-
CLARY, WARREN P.	FFOLLIOTT, PETER F.	1969					
WATER HOLDING CAPACITY OF PONDEROSA PINE FOREST FLOOR LAYERS							
JOURNAL OF SOIL AND WATER CONSERVATION 24(1)							
PAPER NO. 306	RANGE REHABILITATION	PONDEROSA PINE	-	-	-	-	-
CLARY, WARREN P.		1969					
INCREAS SAMPLING PRECISION FOR HERBAGE VARIABLES THRU KNOWLEDGE TMBR OVERSTORY							
JOURNAL OF RANGE MANAGEMENT 22(3):200-201							
PAPER NO. 389		PONDEROSA PINE	X	-	-	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
CLARY, WARREN P. PEARSON, HENRY A. 1969 CATTLE PREFERENCES FOR FORAGE SPECIES IN NORTHERN ARIZONA JOURNAL OF RANGE MANAGEMENT 22(2):114-116 PAPER NO. 395	-	PINYON-JUNIPER	-	-	-	-	-
CLARY, WARREN P. 1971 EFFECTS OF UTAH JUNIPER REMOVAL ON HERBAGE YIELDS FROM SPRINGERVILLE SOILS JOURNAL OF RANGE MANAGEMENT 24(5):373-378 PAPER NO. 305	RANGE REHABILITATION	PINYON-JUNIPER	X	X	-	-	-
CLARY, WARREN P. MORRISON, DOUGLAS C. 1973 LARGE ALLIGATOR JUNIPERS BENEFIT EARLY-SPRING FORAGE JOURNAL OF RANGE MANAGEMENT 26(1):70-71 PAPER NO. 388	VEGETATIVE MGMT	PINYON-JUNIPER	X	-	-	-	-
CLARY, WARREN P. 1974 PINYON-JUNIPER CONTROL - DOES IT PAY? 18TH ANNUAL ARIZONA WATERSHED SYMPOSIUM PROC:26-29 PAPER NO. 309	RANGE REHABILITATION	PINYON-JUNIPER	X	X	X	X	B,C
CLARY, WARREN P. 1974 RESPONSE OF HERBACEOUS VEGETATION TO FELLING OF ALLIGATOR JUNIPER JOURNAL OF RANGE MANAGEMENT 27(5):387-389 PAPER NO. 312	RANGE REHABILITATION	PINYON-JUNIPER	X	X	X	X	-

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
CLARY, WARREN P. ET AL 1974 EFFECTS OF PINYON-JUNIPER REMOVAL ON NATURAL RESOURCE PRODUCTS & USES IN AZ USFS RM-128 RESEARCH PAPER PAPER NO. 316	RANGE REHABILITATION	PINYON-JUNIPER	X	X	X	X	B,C,B/C
CLARY, WARREN P. 1975 MULTIPLE USE EFFECTS OF MANIPULATING PINYON-JUNIPER WATERSHED MANAGEMENT SYMPOSIUM, LOGAN, UTAH PAPER NO. 307	RANGE REHABILITATION	PINYON-JUNIPER	X	X	X	X	B,C,B/C
CLARY, WARREN P. ET AL 1975 CATTLE GRAZING & WOOD PRODUCTION WITH DIFFERENT BASAL AREAS OF PONDEROSA PINE JOURNAL OF RANGE MANAGEMENT 28(6):434-437 PAPER NO. 363	VEGETATIVE MGMT	PONDEROSA BUNCHGRASS	X	X	X	X	B,C,B/C
CLARY, WARREN P. 1975 RANGE MGMT & ITS ECOL BASIS IN PONDEROSA PINE TYPE OF AZ: STATUS OF KNOWLEDGE USFS RM-158 RESEARCH PAPER PAPER NO. 404	-	PONDEROSA PINE	X	X	-	-	B,C
CLARY, WARREN P. ET AL 1978 FACTORS AFFECTING FORAGE CONSUMPTION BY CATTLE IN AZ PONDEROSA PINE FORESTS JOURNAL OF RANGE MANAGEMENT 31(1):9-10 PAPER NO. 394	MULTIPLE	PONDEROSA PINE	X	-	X	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
CLARY, WARREN P.	JAMESON, DONALD A.	1981					
HERBAGE PRODUCTION FOLLOWING TREE & SHRUB REMOVAL IN PINYON-JUNIPER TYPE OF AZ							
JOURNAL OF RANGE MANAGEMENT 34(2):109-113							
PAPER NO. 311	RANGE REHABILITATION	PINYON-JUNIPER	X	X	-	-	-
COUN FOR AGRIC SCI & TECH		1974					
LIVESTOCK GRAZING ON FEDERAL LANDS IN THE 11 WESTERN STATES							
JOURNAL OF RANGE MANAGEMENT 27(3):174-181							
PAPER NO. 410	GENERAL PAPER		X	-	-	-	B,C
CURRIE, PAT O.		1975					
GRAZING MGMT OF PONDEROSA PINE-BUNCHGRASS RANGES OF CENTRAL ROCKY MOUNTAINS							
USFS RM-159 RESEARCH PAPER							
PAPER NO. 401	MULTIPLE	PONDEROSA-BUNCHGRASS	X	X	X	-	-
CUSTER NATIONAL FOREST		1987					
FOREST REPORT							
USFS REGION 1							
PAPER NO. 693	FOREST REPORT	-	X	X	-	-	-
DAWSON, JEFFREY O.		1983					
DINITROGEN-FIXING PLANT SYMBIOSES FOR COMBINED TIMBER AND LIVESTOCK PRODUCTION							
OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:95-112							
PAPER NO. 362	VEGETATIVE MGMT	-	-	-	-	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
DUNFORD, E. G.		1949					
RELATION OF GRAZING TO RUNOFF AND EROSION ON BUNCHGRASS RANGES							
USFS RM-7 RESEARCH NOTES							
PAPER NO. 423	GRAZING SYSTEM		-	-	-	-	-
FFOLLIOTT, PETER F.	CLARY, WARREN P.	1974					
PREDICTING HERBAGE PRODUCTION FROM FOREST GROWTH IN ARIZONA PONDEROSA PINE							
PROGRESSIVE AGRICULTURE IN ARIZONA 26(3):3-5							
PAPER NO. 384	VEGETATIVE MGMT	PONDEROSA PINE	X	-	-	-	-
FFOLLIOTT, PETER F.	CLARY, WARREN P.	1975					
DIFF IN HERBAGE-TIMBER RELATION ON SEDIMENTARY & IGNEOUS SOILS IN AZ PONDEROSA							
PROGRESSIVE AGRICULTURE IN ARIZONA 27(5):6-7							
PAPER NO. 396	-	PONDEROSA PINE	X	-	-	-	-
FFOLLIOTT, PETER F.	ET AL	1977					
EFFECTS OF A PRESCRIBED FIRE IN AN ARIZONA PONDEROSA PINE FOREST							
USFS RM-336 RESEARCH NOTE							
PAPER NO. 320	RANGE REHABILITATION	PONDEROSA PINE	X	X	-	-	B
FINK, DWAYNE H.	COOLEY, KEITH R.	1973					
WATER HARVESTING FOR IMPROVED GRAZING EFFICIENCY							
COPIES AVAILABLE UPON REQUEST							
PAPER NO. 369	WATER DEVELOPMENT	WESTERN RANGE	-	-	-	-	B,C

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
GARRETT, LAWRENCE D.		1981					
MULTIRESOURCE RESEARCH & ITS IMPLICATIONS TO MGMT: THE BEAVER CREEK BIOSPHERE							
WORKSHOP ON WILDLIFE & RANGE RES NEEDS IN N MEXICO & SW US, RIO RICO AZ:40-44							
PAPER NO. 525	-	PNYN-JNPR & PONDRSA	X	-	-	-	-
GARY, HOWARD L.		1975					
WATERSHED MGMT PROBLEMS & OPPORTUNITIES FOR COLORADO FRONT RANGE PONDEROSA PIN							
USFS RM-139 RESEARCH PAPER							
PAPER NO. 725	GENERAL WATERSHED MGMT	PONDEROSA PINE	-	-	-	-	-
GIFFORD, GERALD F.	ET AL	1970					
INFILTRATION & EROSION STUDIES ON PINYON-JUNIPER CONVERSION SITES IN S. UTAH							
JOURNAL OF RANGE MANAGEMENT 23(6):402-406							
PAPER NO. 308	RANGE REHABILITATION	PINYON-JUNIPER	-	-	-	-	-
GIFFORD, GERALD F.		1973					
RUNOFF & SEDIMENT YIELDS FROM RUNOFF PLOTS ON CHAINED PINYON-JUNIPER SITE-UTAH							
JOURNAL OF RANGE MANAGEMENT 26(6):440-443							
PAPER NO. 325	RANGE REHABILITATION	PINYON-JUNIPER	-	-	-	-	-
GIFFORD, GERALD F.	HAWKINS, RICHARD H.	1976					
GRAZING SYSTEMS AND WATERSHED MANAGEMENT: A LOOK AT THE RECORD							
JOURNAL OF SOIL AND WATER CONSERVATION 31(6):281-283							
PAPER NO. 419	GRAZING SYSTEM	VARIOUS	-	-	-	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
GIFFORD, GERALD F.	WHITEHEAD, JOHN M.	1982					
SOIL EROSION EFFECT ON PRODUCTIVITY IN RANGELAND ENVIRON; WHERE IS RESEARCH?							
JOURNAL OF RANGE MANAGEMENT 35(6):801-802							
PAPER NO. 322	RANGE REHABILITATION	WESTERN RANGELANDS	-	-	-	-	-
GREENE, GEOFFREY E.		1973					
RANGE WATER DEVELOPMENT: THE CHALLENGE - THE REWARD							
COPIES AVAILABLE UPON REQUEST							
PAPER NO. 368	WATER DEVELOPMENT	PLAINS GRASSLANDS	-	-	-	-	B
HARVEY, MICHAEL D.	ET AL	1985					
GULLY EROSION							
BUREAU OF LAND MANAGEMENT, TECHNICAL NOTE 366							
PAPER NO. 303	RANGE REHABILITATION	WEST RANGELAND	-	-	-	-	-
HEEDE, BURCHARD H.		1976					
GULLY DEVELOPMENT AND CONTROL: THE STATUS OF OUR KNOWLEDGE							
USFS RM-169 RESEARCH PAPER							
PAPER NO. 302	RANGE REHABILITATION		-	-	-	-	B,C,B/C
HEEDE, BURCHARD H.		1983					
CONTROL OF RILLS & GULLIES IN OFF-ROAD VEHICLE TRAFFIC AREAS							
ENVIRON EFFECTS OF OFF-ROAD VEHICLES-IMPACTS & MGMT, ARID REGION:245-264							
PAPER NO. 301	RANGE REHABILITATION	DESERT	-	-	-	-	B,C

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
HIBBERT, ALDEN R.	ET AL	1974					
CHAPARRAL CONVERSION POTENTIAL IN AZ, PART I: WATER YIELD RESPONSE & EFFECTS							
USFS RM-126 RESEARCH PAPER							
PAPER NO. 520	VEGETATIVE MGMT	CHAPARRAL	X	-	-	-	-
HIBBERT, ALDEN R.		1983					
WATER YIELD IMPROVEMENT POTENTIAL BY VEGETATION MGMT ON WESTERN RANGELANDS							
WATER RESOURCES BULLETIN 19(3):375-381							
PAPER NO. 511	VEGETATIVE MGMT	-	-	-	-	-	B,C
HIBBERT, ALDEN R.		UNKWN					
OPPORTUNITIES TO INCREASE WATER YLD IN THE SOUTHWEST BY VEGETATION MANAGEMENT							
USFS RM, TEMPE, ARIZONA							
PAPER NO. 514	VEGETATIVE MGMT	VARIOUS	-	-	-	-	-
JAMESON, DONALD A.	DODD, J. D.	1969					
HERBAGE PRODUCTION DIFFERS WITH SOIL IN THE PINYON-JUNIPER TYPE OF ARIZONA							
USFS RM-131 RESEASRCH NOTE							
PAPER NO. 386	-	PINYON-JUNIPER	X	-	-	-	-
JOYCE, LINDA A.	ET AL	1986					
RANGE FORAGE DATA BASE FOR 20 GREAT PLAINS, SOUTHERN, AND WESTERN STATES							
USFS RM-133 GENERAL TECHNICAL REPORT							
PAPER NO. 390	-	ALL	X	-	X	-	-

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
KLEMMEDSON, J. O.	TIEDEMANN, A. R.	1986					
LONG-TERM EFFECT OF MESQUITE REMOVAL ON SOIL CHARAC: II. NUTRIENT AVAILABILITY							
SOIL SCIENCE SOCIETY OF AMERICAN JOURNAL 50:476-480							
PAPER NO. 314	RANGE REHABILITATION	DESERT GRASSLAND	-	-	-	-	-
KLIPPLE, GRAYDON E.		1964					
EARLY/LATE-SEASON GRAZ VS SEASON-LONG GRAZ OF SHORT-GRASS VEG CTRL GRT PLAINS							
USFS RM-11 RESEARCH PAPER							
PAPER NO. 422	GRAZING SYSTEM	SHORT-GRASS	-	-	-	X	-
LEAF, CHARLES F.		1975					
WATERSHED MGMT IN CENTRAL & SOUTHERN ROCKY MTNS: SUMMARY OF STATUS OF KNOWLEDG							
USFS RM-142 RESEARCH PAPER							
PAPER NO. 723	GENERAL WATERSHED MGMT	SAGEBRUSH	-	-	-	-	-
LEAF, CHARLES F.		1975					
WATERSHED MANAGEMENT IN ROCKY MOUNTAIN SUBALPINE ZONE: STATUS OF OUR KNOWLEDGE							
USFS RM-137 RESEARCH PAPER							
PAPER NO. 726	GENERAL WATERSHED MGMT	SUBALPINE	-	-	-	-	-
LINCOLN NATIONAL FOREST	-	1985					
AGUA CHIQUITA ALLOTMENT MANAGEMENT PLAN							
USFS REGION 3							
PAPER NO. 699	GRAZING SYSTEM	-	-	-	-	-	B,C

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
MARTIN, S. CLARK		1978					
EVALUATING IMPACT CATTLE GRAZING ON RIPARIAN HABITATS IN NATL FORESTS OF AZ/NM							
FORUM - GRAZING & RIPARIAN/STREAM ECOSYSTEMS PROC, TROUT UNLIMITED (PUB):35-38							
PAPER NO. 631	RANGE MANAGEMENT	RIPARIAN	-	-	-	-	-
MCGINNIES, WILLIAM J.	NICHOLAS, PAULA J.	1980					
EFFECTS OF TOPSOIL THICKNESS/NITROGEN FERTILIZER ON REVEGETATION OF COAL MINE							
JOURNAL OF ENVIRONMENTAL QUALITY 9(4):681-686							
PAPER NO. 324	RANGE REHABILITATION	SAGEBRUSH	X	X	-	-	-
NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OF SCIENCES		1984					
ECONOMIC FEASIBILITY AND PUBLIC RANGE INVESTMENT							
DEVELOPING STRATEGIES FOR RANGELAND MGMT, WESTVIEW PRESS, BOULDER, CO, 1984							
PAPER NO. 375	GENERAL PAPER	ALL	X	X	X	X	B,C,B/C,IRR
NIELSEN, DARWIN B.		1964					
ESTIMATING THE ECONOMIC VALUE OF THE RANGE RESOURCE FROM LIVESTOCK PRODUCTION							
COMMITTEE ON ECON OF RNG USE & DEVELOP OF WAGRIC ECON RESEARCH COUNCIL, RPT 6							
PAPER NO. 374	GENERAL PAPER	-	X	X	X	X	B,C
NIELSEN, DARWIN B.	GODFREY, E. BRUCE	1977					
RURAL/REGIONAL ECON ASPECTS OF LIVESTOCK & WILDLIFE/FISHERIES USE OF W. RNGLDS							
PROC OF WORKSHOP ON LIVESTOCK/WILDLIFE-FISH RELATIONSHIPS IN GREAT BASIN:19-24							
PAPER NO. 378	GENERAL PAPER	WESTERN RANGELAND	-	-	-	-	B,C

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
OSWALD, BRIAN P.	COVINGTON, W. WALLACE	1984					
EFFECT OF PRESCRIBED FIRE ON HERBAGE PRODUCT IN SW PONDEROSA ON SEDIMENT SOILS							
FOREST SCIENCE 30(1):22-25							
PAPER NO. 321	RANGE REHABILITATION	PONDEROSA PINE	X	X	-	-	-
PACKER, PAUL E.		1953					
EFFECTS OF TRAMPLING DISTURBANCE ON WATERSHED CONDITION, RUNOFF, AND EROSION							
JOURNAL OF FOREST SCIENCE 1(1):28-31							
PAPER NO. 421	GENERAL PAPER	-	-	-	-	-	-
PASE, CHARLES P.	THILENIUS, JOHN F.	1968					
COMPOSITION, PRODUCTION & SITE FACTORS OF SOME GRASSLANDS IN BLACK HILLS OF SD							
USFS RM-103 RESEARCH NOTE							
PAPER NO. 398	GENERAL	PLAINS GRASSLANDS	X	X	-	-	-
PAULSEN, HAROLD A., JR.		1975					
RANGE MGMT IN CENTRAL & SOUTHERN ROCKY MTNS: SUMMARY OF STATUS OF KNOWLEDGE							
USFS RM-154 RESEARCH PAPER							
PAPER NO. 403	MULTIPLE	VARIOUS	X	X	X	-	B,C
PEARSON, H. A.	ET AL	1972					
EFFECTS OF WILDFIRE ON TIMBER & FORAGE PRODUCTION IN ARIZONA							
JOURNAL OF RANGE MANAGEMENT 25(4):250-253							
PAPER NO. 80	RANGE REHABILITATION	PONDEROSA PINE	X	X	-	-	-

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
PEARSON, HENRY A. JAMESON, DONALD A. 1967 RELATIONSHIP BETWEEN TIMBER & CATTLE PRODUCTION ON PONDEROSA PINE RANGE... USFS RM, HANDOUT FOR FIELD TRIPS; NOT A PUBLICATION							
PAPER NO. 366	VEGETATIVE MGMT	PONDEROSA PINE	-	-	-	-	-
PEARSON, HENRY A. 1971 ESTIM CATTLE GAINS FROM CONSUMPTION OF DIGESTIBLE FORAGE ON PONDEROSA PINE RNG JOURNAL OF RANGE MANAGEMENT 25(1):18-20							
PAPER NO. 392	-	PONDEROSA PINE	X	-	X	-	-
PEARSON, HENRY A. 1973 CALCULATING GRAZING INTENSITY FOR MAX PROFIT ON PONDEROSA PINE RANGE IN N. AZ JOURNAL OF RANGE MANAGEMENT 26(4):277-278							
PAPER NO. 373	GRAZING SYSTEM	PONDEROSA PINE	X	X	X	X	B,C
RAUZI, FRANK HANSON, CLAYTON L. 1966 WATER INTAKE AND RUNOFF AS AFFECTED BY INTENSITY OF GRAZING JOURNAL OF RANGE MANAGEMENT 19(6):351-356							
PAPER NO. 535	GRAZING	MIXED PRAIRIE	-	-	-	-	-
REYNOLDS, HUDSON G. ET AL 1970 GAMBEL OAK FOR SOUTHWESTERN WILDLIFE JOURNAL OF FORESTRY (SEPT 1970):545-547							
PAPER NO. 346		PONDEROSA PINE	X	X	-	-	-

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
RICH, LOWELL R. REYNOLDS, HUDSON G. 1963 GRAZING IN RELATION TO RUNOFF & EROSION ON SOME CHAPARRAL WATERSHEDS OF CTR AZ JOURNAL OF RANGE MANAGEMENT 16(6):322-326 PAPER NO. 417	GRAZING SYSTEM	CHAPARRAL	-	-	-	-	B
RIITTERS, KURT ET AL 1982 DYNAMIC PROGRAMMING OPTIMIZATION TIMBER PRODUCTION & GRAZING IN PONDEROSA PINE FOREST SCIENCE 28(3):517-526 PAPER NO. 100	VEGETATIVE MANAGEMENT	PONDEROSA PINE	X	X	X	X	B,C
SAWTOOTH NATIONAL FOREST - 1986 STANLEY BASIN ANALYSIS, SAWTOOTH NATIONAL RECREATION AREA USFS SAWTOOTH NATIONAL FOREST PAPER NO. 714	HABITAT IMPROVEMENT	-	-	-	-	-	B,C,B/C
SCHMIDT, WYMAN C. 1979 UNDERSTORY VEGETATION RESPONSE TO HARVEST & RESIDUE MGMT IN LARCH/FIR FOREST USFS INT-90 GENERAL TECHNICAL REPORT:221-248 PAPER NO. 357	VEGETATIVE MGMT	LARCH/DOUGLAS FIR	X	-	-	-	-
SHARP, A. J. EL AL 1964 RUNOFF AS AFFECTED BY INTENSITY OF GRAZING ON RANGELAND JOURNAL OF SOIL AND WATER CONSERVATION 19:103-106 PAPER NO. 408	GRAZING SYSTEM	-	X	X	X	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
SMITH, DWIGHT R.		1967					
EFFECTS OF CATTLE GRAZING ON A PONDEROSA PINE-BUNCHGRASS RANGE IN COLORADO							
USFS TECHNICAL BULLETIN 1371							
PAPER NO. 412	GRAZING SYSTEM	PONDEROSA-BUNCHGRASS	-	-	-	-	
SPRINGFIELD, H. W.		1976					
CHARACTERISTICS & MGMT OF SW PINYON-JUNIPER RANGES: STATUS OF OUR KNOWLEDGE							
USFS RM-160 RESEARCH PAPER							
PAPER NO. 399	MULTIPLE	PINYON-JUNIPER	X	X	-	-	B,C
STURGES, DAVID L.		1975					
HYDRO RELATION ON UNDISTURB/CONVERT BIG SAGEBRUSH LANDS: STATUS OF KNOWLEDGE							
USFS RM-140 RESEARCH PAPER							
PAPER NO. 315	RANGE REHABILITATION	SAGEBRUSH	X	X	-	-	-
THILL, RONALD E.	ET AL	1983					
DEER AND ELK FORAGE PRODUCTION IN ARIZONA MIXED CONIFER FORESTS							
USFS RM-248 RESEARCH PAPER							
PAPER NO. 350	VEGETATIVE MGMT	-	X	X	-	-	B
THOMAS, JACK WARD	ET AL	1978					
RIPARIAN ZONES IN MANAGED RANGELANDS-THEIR IMPORTANCE TO WILDLIFE							
FORUM: GRAZING & RIPARIAN/STREAM ECOSYSTEMS, MARCH 1979, TROUT UNLIMITED:21-31							
PAPER NO. 407	GRAZING SYSTEM	RIPARIAN ZONE		-	-	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
TIEDEMANN, A. R.	KLEMMEDSON, J. O.	1986					
LONG-TERM EFFECT OF MESQUITE REMOVAL ON SOIL CHARAC: I. NUTRIENTS/BULK DENSITY							
SOIL SCIENCE SOCIETY OF AMERICAN JOURNAL 50(2):472-475							
PAPER NO. 313	RANGE REHABILITATION	DESERT GRASSLAND	-	-	-	-	-
TURNER, GEORGE T.	PAULSEN, HAROLD A., JR.	1976					
MANAGEMENT OF MOUNTAIN GRASSLANDS IN CENTRAL ROCKIES: STATUS OF OUR KNOWLEDGE							
USFS RM-161 RESEARCH PAPER							
PAPER NO. 400	MULTIPLE	MOUNTAIN GRASSLAND	X	-	X	-	B,C
USDA SCS	USDA FS	1958					
SANDIA MOUNTAINS TRIBUTARIES OF THE RIO GRANDE WATERSHED, SANDOVAL COUNTY, NM							
USFS REGION 3							
PAPER NO. 701	FLOOD CONTROL	-	-	-	-	-	B,C
VALENTINE, K. A.		1947					
DISTANCE FROM WATER AS A FACTOR IN GRAZING CAPACITY OF RANGELAND							
JOURNAL OF FORESTRY 45(10):749-754							
PAPER NO. 371	WATER DEVELOPMENT	-	X	X	X	X	-
VAN DERSAL, WILLIAM R.		UNKWN					
THE DEPENDENCE OF SOILS ON ANIMAL LIFE							
2ND NORTH AMERICAN WILDLIFE CONF:458-467							
PAPER NO. 340	-	-	-	-	-	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 1, 2, 3 AND 4

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
WORKMAN, JOHN P. HOOPER, JACK F. 1968							
PRELIMINARY ECON EVALUATION OF CATTLE DISTRIBUTION PRACTICES ON MTN RANGELANDS							
JOURNAL OF RANGE MANAGEMENT 21(5):301-304							
PAPER NO. 372	MULTIPLE	MOUNTAIN RANGELAND	X	X	X	X	B,C,B/C,IRR

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
ALLAN, J. R.	SMOLIAK, S.	1973					
MAINTAINING WATER QUALITY THROUGH CONTROL OF AQUATIC VEGETATION							
COPIES AVAILABLE UPON REQUEST							
PAPER NO. 370	WATER DEVELOPMENT		-	-	-	-	-
ANDERSON, HENRY W.	ET AL	1986					
FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY							
USFS PSW-18 GENERAL TECHNICAL REPORT							
PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
BLACKBURN, WILBERT H.		1984					
IMPACTS OF GRAZING INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC							
DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO							
PAPER NO. 411	GRAZING SYSTEM	VARIOUS	-	-	-	-	-
CLEARY, DELBERT V.		1983					
FORAGE FOR WILDLIFE: GRASSLAND AND FORESTS							
OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:297-307							
PAPER NO. 342	-	DOUGLAS-FIR	W	W	-	-	-
COUN FOR AGRIC SCI & TECH		1974					
LIVESTOCK GRAZING ON FEDERAL LANDS IN THE 11 WESTERN STATES							
JOURNAL OF RANGE MANAGEMENT 27(3):174-181							
PAPER NO. 410	GENERAL PAPER		X	-	-	-	B,C

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
DAWSON, JEFFREY O.		1983					
DINITROGEN-FIXING PLANT SYMBIOSES FOR COMBINED TIMBER AND LIVESTOCK PRODUCTION							
OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:95-112							
PAPER NO. 362	VEGETATIVE MGMT	-	-	-	-	-	-
GIFFORD, GERALD F.	HAWKINS, RICHARD H.	1976					
GRAZING SYSTEMS AND WATERSHED MANAGEMENT: A LOOK AT THE RECORD							
JOURNAL OF SOIL AND WATER CONSERVATION 31(6):281-283							
PAPER NO. 419	GRAZING SYSTEM	VARIOUS	-	-	-	-	-
GIFFORD, GERALD F.	WHITEHEAD, JOHN M.	1982					
SOIL EROSION EFFECT ON PRODUCTIVITY IN RANGELAND ENVIRON; WHERE IS RESEARCH?							
JOURNAL OF RANGE MANAGEMENT 35(6):801-802							
PAPER NO. 322	RANGE REHABILITATION	WESTERN RANGELANDS	-	-	-	-	-
HALL, FREDERICK C.		1983					
APPLICATION AND INTERPRETATION OF FOREST ECOSYSTEMS CLASSIFICATION							
FORESTLAND GRAZING, SYMPOSIUM PROC, WASHINGTON STATE UNIV EXTENSION SVC:7-14							
PAPER NO. 361	GENERAL PAPER		X	-	-	-	-
JACKSON, T. L.		1983					
SOIL FERTILITY AFFECTS FORAGE PRODUCTION IN WESTERN OREGON							
OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:65-72							
PAPER NO. 331	RANGE REHABILITATION	DOUGLAS-FIR	X	X	-	-	-

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
JOYCE, LINDA A.	ET AL	1986					
RANGE FORAGE DATA BASE FOR 20 GREAT PLAINS, SOUTHERN, AND WESTERN STATES							
USFS RM-133 GENERAL TECHNICAL REPORT							
PAPER NO. 390	-	ALL	X	-	X	-	-
LIACOS, LEONIDAS G.		1962					
WATER YIELD AS INFLUENCED BY DEGREE OF GRAZING IN CALIFORNIA WINTER GRASSLANDS							
JOURNAL OF RANGE MANAGEMENT 15:34-42							
PAPER NO. 415	GRAZING SYSTEM	-	-	-	-	-	-
MCDONALD, PHILIP M.		1986					
GRASSES IN YOUNG CONIFER PLANTATIONS - HINDRANCE AND HELP							
NORTHWEST SCIENCE 60(4):271-278							
PAPER NO. 367	VEGETATIVE MGMT	-	-	-	-	-	-
MCLEAN, ALASTAIR		1983					
PRODUCING FORAGE FOR LIVESTOCK ON FOREST RANGES							
OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:175-183							
PAPER NO. 382	VEGETATIVE MGMT	FORESTED RANGE	-	X	X	X	-
MCLEAN, ALASTAIR		1983					
CLASSIFICATION AND MANAGEMENT OF THE DOUGLAS-FIR-PINEGRASS REGION							
FORESTLAND GRAZING, SYMPOSIUM PROC, WASHINGTON STATE UNIV EXTENSION SVC:15-18							
PAPER NO. 397		DOUGLAS-FIR	X	-	X	-	-

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
MOSHER, WAYNE	BEDELL, THOMAS	1983					
SEEDBED PREPARATION AND ESTABLISHMENT OF PORAGE SPECIES IN OREGON							
OR ST UNIV, COLLEGE OP AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:51-63							
PAPER NO. 332	RANGE REHABILITATION	DOUGLAS-FIR	-	-	-	-	-
NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OP SCIENCES		1984					
ECONOMIC FEASIBILITY AND PUBLIC RANGE INVESTMENT							
DEVELOPING STRATEGIES FOR RANGELAND MGMT, WESTVIEW PRESS, BOULDER, CO, 1984							
PAPER NO. 375	GENERAL PAPER	ALL	X	X	X	X	B,C,B/C,IRR
NIELSEN, DARWIN B.		1964					
ESTIMATING THE ECONOMIC VALUE OP THE RANGE RESOURCE FROM LIVESTOCK PRODUCTION							
COMMITTEE ON ECON OP RNG USE & DEVELOP OF WAGRIC ECON RESEARCH COUNCIL, RPT 6							
PAPER NO. 374	GENERAL PAPER	-	X	X	X	X	B,C
NIELSEN, DARWIN B.	GODFREY, E. BRUCE	1977					
RURAL/REGIONAL ECON ASPECTS OP LIVESTOCK & WILDLIFE/FISHERIES USE OF W. RNGLDS							
PROC OP WORKSHOP ON LIVESTOCK/WILDLIFE-PISH RELATIONSHIPS IN GREAT BASIN:19-24							
PAPER NO. 378	GENERAL PAPER	WESTERN RANGELAND	-	-	-	-	B,C
RAGUSE, C. A.	ET AL	1986					
PLANT, LIVESTOCK & ECONOMIC RESPONSES TO SELECTIVE FERTIL OF ANNUAL RANGELAND							
34TH ANNUAL CALIFORNIA PERTILIZER CONF PROC:53-61							
PAPER NO. 330	RANGE REHABILITATION	OAK-PINE	X	-	X	X	B,C

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
SCHULTZ, BOB	PLUMAS NATIONAL FOREST	1987					
POCO CREEK RESTORATION PROJECT: BECKWOURTH RANGER DISTRICT							
USFS PLUMAS NATIONAL FOREST							
PAPER NO. 715	HABITAT IMPROVEMENT	-	-	-	-	-	B,C,B/C
THOMAS, JACK WARD	ET AL	1978					
RIPARIAN ZONES IN MANAGED RANGELANDS-THEIR IMPORTANCE TO WILDLIFE							
FORUM: GRAZING & RIPARIAN/STREAM ECOSYSTEMS, MARCH 1979, TROUT UNLIMITED:21-31							
PAPER NO. 407	GRAZING SYSTEM	RIPARIAN ZONE	-	-	-	-	-
VAN DERSAL, WILLIAM R.		UNKWN					
THE DEPENDENCE OF SOILS ON ANIMAL LIFE							
2ND NORTH AMERICAN WILDLIFE CONF:458-467							
PAPER NO. 340	-	-	-	-	-	-	-
VAVRA, MARTIN		1983					
MANAGING GRAZING ANIMAL RESPONSE TO FORESTLAND VEGETATION							
FORESTLAND GRAZING, SYMPOSIUM PROC, SPOKANE, WASHINGTON:43-51							
PAPER NO. 393	VEGETATIVE MGMT	-	X	X	X	X	-
WILLIAMS, KING		1983					
FOREST GRAZING: A RANCHER'S VIEWPOINT, PROFIT AND LOSS							
FORESTLAND GRAZING, SYMPOSIUM PROC, WASHINGTON STATE UNIV EXTENSION SVC:59-62							
PAPER NO. 376	GENERAL PAPER	-	-	-	-	-	B,C

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
ALLAN, J. R.	SMOLIAK, S.	1973					
MAINTAINING WATER QUALITY THROUGH CONTROL OF AQUATIC VEGETATION							
COPIES AVAILABLE UPON REQUEST							
PAPER NO. 370	WATER DEVELOPMENT	-	-	-	-	-	-
ALLAN, PHILIP F.	ET AL	1963					
RATING NORTHEASTERN SOILS FOR THEIR SUITABILITY FOR WILDLIFE HABITAT							
28TH NORTH AMERICAN WILDLIFE CONF:247-261							
PAPER NO. 334	GENERAL PAPER	VARIOUIS	-	-	-	-	-
ANDERSON, HENRY W.	ET AL	1986					
FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY							
USFS PSW-18 GENERAL TECHNICAL REPORT							
PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
BLACKBURN, W. H.		1983					
LIVESTOCK GRAZING IMPACTS ON WATERSHEDS							
RANGELANDS 5(3):123-125							
PAPER NO. 529	GRAZING	PLAINS GRASSLANDS	-	-	-	-	-
BLACKBURN, WILBERT H.		1984					
IMPACTS OF GRAZING INTENSITY & SPECIALIZED GRAZING SYSTEMS ON WATERSHED CHARAC							
DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT, WESTVIEW PRESS, BOULDER, CO							
PAPER NO. 411	GRAZING SYSTEM	VARIOUS	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
BLAIR, ROBERT M.		1971					
FORAGE PRODUCTION AFTER HARDWOOD CONTROL IN A SOUTHERN PINE-HARDWOOD STAND							
FOREST SCIENCE 17(3):279-284							
PAPER NO. 310	RANGE REHABILITATION	LOBLLY-SHORTLF	X	-	-	-	-
BROCK, J. H.	ET AL	1982					
INFILTRATION & SEDIMENT PRODUCTION ON DEEP HARDLAND RANGE SITE IN N. CEN TX							
JOURNAL OF RANGE MANAGEMENT 35(2):195-198							
PAPER NO. 323	RANGE REHABILITATION	PLAINS GRASSLANDS	-	-	-	-	-
BRYANT, H. T.	ET AL	1972					
EFFECT TRAMPLING BY CATTLE ON BLUEGRASS YIELD/SOIL COMPACT OF MEADOWVILLE LOAM							
AGRONOMY JOURNAL 64(3):331-334							
PAPER NO. 387	GRAZING SYSTEM	BLUEGRASS	X	X	-	-	-
BYRNE, JAMES G.	ZEEDYK, WILLIAM D.	1965					
APPLIC OF SOIL SURVEY INFO TO FOREST-GAME HABITAT MGMT ON CUMBERLAND NATL FOR							
SE GAME & FISH COMMITTEE OF THE WILDLIFE SOCIETY PROC 1965:174-181							
PAPER NO. 336	MULTIPLE	VARIOUS	-	-	-	-	-
CHEQUAMEGON NATIONAL FORE		1987					
FOREST REPORT							
USFS REGION 9							
PAPER NO. 684	FOREST REPORT	-	-	-	-	-	B,C

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
CRAWFORD, BILL T.		1950					
SOME SPECIFIC RELATIONSHIPS BETWEEN SOILS AND WILDLIFE							
JOURNAL OF WILDLIFE MANAGEMENT 14(2):115-123							
PAPER NO. 337	-	-	-	-	-	-	-
CRAWFORD, BILL T.		UNKWN					
WILDLIFE SAMPLING BY SOIL TYPES							
11TH NORTH AMERICAN WILDLIFE CONF:357-364							
PAPER NO. 338	-	-	-	-	-	-	B
DAWSON, JEFFREY O.		1983					
DINITROGEN-FIXING PLANT SYMBIOSES FOR COMBINED TIMBER AND LIVESTOCK PRODUCTION							
OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:95-112							
PAPER NO. 362	VEGETATIVE MGMT	-	-	-	-	-	-
DISSMEYER, GEORGE E.	COST, NOEL D.	1984					
MULTIRESOURCE INVENTORIES: WATERSHED CONDITION OF COMMERCIAL FOREST LAND IN SC							
USFS SE-247 RESEARCH PAPER							
PAPER NO. 722	GENERAL WATERSHED MGMT	-	-	-	-	-	-
DUVALL, V. L.	WHITAKER, L. B.	1964					
ROTATION BURNING: A FORAGE MANAGEMENT SYSTEM FOR LONGLEAF PINE-BLUESTEM RANGES							
JOURNAL OF RANGE MANAGEMENT 17(6):322-326							
PAPER NO. 318	RANGE REHABILITATION	LONGLEAF-BLUE STEM	X	X	-	X	-

FORAGE MODEL - CITATIONS FOR REGIONS 8 AND 9

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
GIFFORD, GERALD F. HAWKINS, RICHARD H. 1976 GRAZING SYSTEMS AND WATERSHED MANAGEMENT: A LOOK AT THE RECORD JOURNAL OF SOIL AND WATER CONSERVATION 31(6):281-283 PAPER NO. 419	GRAZING SYSTEM	VARIOUS	-	-	-	-	-
GRELEN, H. E. ET AL 1984 RESPONSE OF SLASH PINE TO GRAZING FROM REGENERATION TO FIRST PULPWOOD THINNING USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:523-527 PAPER NO. 171	GRAZING SYSTEM	SLASH PINE		-	-	-	-
HALLS, L. K. ET AL 1956 GRAZING CAPACITY OF WIREGRASS--PINE RANGES OF GEORGIA GEORGIA AGRIC EXP STA, UNIV OF GEORGIA COL OF AGRIC, TECHNICAL BULLETIN N.S. 2 PAPER NO. 413	-	PINE-WIREGRASS	-	X	-	-	B
HALLS, L. K. ET AL 1957 SEASONAL VARIATION IN GRAZING USE, NUTRITIVE CONTENT & DIGESTIBILITY WIREGRASS GEORGIA AGRIC EXP STA, UNIV OF GEORGIA COL OF AGRIC, TECHNICAL BULLETIN N.S.11 PAPER NO. 414	GRAZING SYSTEM	PINE-WIREGRASS	-	-	-	-	-
HALLS, LOWELL K. SCHUSTER, JOSEPH L. 1965 TREE-HERBAGE RELATIONS IN PINE-HARDWOOD FORESTS OF TEXAS JOURNAL OF FORESTRY 63(4):282-283 PAPER NO. 365	-	PINE-HARDWOOD	X	X	-	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 8 AND 9

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
HURST, GEORGE A.	WARREN, RANDY C.	1982					
IMPACTS OF SILVIC PRACTICES IN LOBLOLLY PLANTATIONS ON WHITE-TAILED DEER HAB							
USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURE RESEARCH CONF PROC:484-487							
PAPER NO. 347	MULTIPLE	-	X	X	-	-	-
JOYCE, LINDA A.	ET AL	1986					
RANGE FORAGE DATA BASE FOR 20 GREAT PLAINS, SOUTHERN, AND WESTERN STATES							
USFS RM-133 GENERAL TECHNICAL REPORT							
PAPER NO. 390	-	ALL	X	-	X	-	-
LEWIS, CLIFFORD E.		1970					
RESPONSES TO CHOPPING AND ROCK PHOSPHATE ON SOUTH FLORIDA RANGES							
JOURNAL OF RANGE MANAGEMENT 23(4):276-282							
PAPER NO. 327	RANGE REHABILITATION	LONGLEAF-SLASH PINE	X	X	-	-	-
LEWIS, CLIFFORD E.	ET AL	1982					
PRESCRIBED BURNING IN SOUTHERN FOREST & RANGELAND IMPROVES FORAGE & ITS USE							
SOUTHERN JOURNAL OF APPLIED FORESTRY 6(1):19-25							
PAPER NO. 317	RANGE REHABILITATION	ALL SOUTHERN	X	X	-	X	-
LEWIS, CLIFFORD E.	ET AL	UNKWN					
FORAGE YIELDS IMPROVED BY SITE PREPARATION IN PINE FLATWOODS OF NORTH FLORIDA							
SOUTHERN JOURNAL OF APPLIED FORESTRY:181-185							
PAPER NO. 354	SITE PREPARATION	SLASH PINE	X	X	-	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 8 AND 9

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
LULL, HOWARD W.	REINHART, KENNETH G.	1972					
FORESTS AND FLOODS IN THE EASTERN UNITED STATES							
USFS NE-226 RESEARCH PAPER							
PAPER NO. 429	GENERAL PAPER	-	-	-	-	-	-
LUNDGREN, GWYNNE K.	ET AL	1983					
AN ECONOMIC ANALYSIS OF FOREST GRAZING ON FOUR TIMBER MANAGEMENT SITUATIONS							
SOUTHERN JOURNAL OF APPLIED FORESTRY 7(3):119-124							
PAPER NO. 352	VEGETATIVE MGMT	LONGLEAF-SLASH PINE	X	X	X	X	B,C,IRR
MOORE, WILLIAM H.	ET AL	1982					
VEGETATIVE RESPONSE TO PRESCRIBED FIRE IN A NORTH FLORIDA FLATWOODS FOREST							
JOURNAL OF RANGE MANAGEMENT 35(3):386-389							
PAPER NO. 319	RANGE REHABILITATION	LONGLEAF-SLASH PINE	X	X	-	-	-
MOORE, WILLIAM H.	ET AL	1982					
VEGETATIVE RESPONSE TO CLEARCUTTING & CHOPPING IN A N FLORIDA FLATWOODS FOREST							
JOURNAL OF RANGE MANAGEMENT 35(2):214-218							
PAPER NO. 326	RANGE REHABILITATION	LONGLEAF-SLASH PINE	X	X	-	-	-
MURPHY, DEAN A.	PORATH, WAYNE R.	UNKWN					
FOREST SOILS AND GAME NUTRITION							
MISSOURI DEPT OF CONSERVATION, COLUMBIA, MISSOURI							
PAPER NO. 339	-		-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
NATIONAL RESEARCH COUNCIL NAT'L ACADEMY OF SCIENCES 1984							
ECONOMIC FEASIBILITY AND PUBLIC RANGE INVESTMENT							
DEVELOPING STRATEGIES FOR RANGELAND MGMT, WESTVIEW PRESS, BOULDER, CO, 1984							
PAPER NO. 375	GENERAL PAPER	ALL	X	X	X	X	B,C,B/C,IRR
NIELSEN, DARWIN B. 1964							
ESTIMATING THE ECONOMIC VALUE OF THE RANGE RESOURCE FROM LIVESTOCK PRODUCTION							
COMMITTEE ON ECON OF RNG USE & DEVELOP OF WAGRIC ECON RESEARCH COUNCIL, RPT 6							
PAPER NO. 374	GENERAL PAPER	-	X	X	X	X	B,C
PEARSON, H. A. WHITAKER, L. B. 1974							
FORAGE & CATTLE RESPONSES TO DIFF GRAZING INTENSITIES ON SOUTHERN PINE RIDGE							
JOURNAL OF RANGE MANAGEMENT 27(6):444-446							
PAPER NO. 405	GRAZING SYSTEM	PINE-BLUESTEM	X	X	X	X	B
PEARSON, H. A. 1975							
HERBAGE DISAPPEARANCE & GRAZING CAPACITY DETERM OF SOUTHERN PINE BLUESTEM RNG							
JOURNAL OF RANGE MANAGEMENT 28(I):71-73							
PAPER NO. 406	GRAZING SYSTEM	SOUTH PINE-BLUESTEM	X	X	X	X	-
PEARSON, HENRY A. 1980							
FOREST AND RANGE INTERACTIONS							
USFS SO-34 GTR, IST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:339-342							
PAPER NO. 360	-	SOUTHERN FOREST	X	X	X	X	B,C,IRR

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
PEARSON, HENRY A.		1983					
FOREST GRAZING IN THE SOUTHERN UNITED STATES							
OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:247-260							
PAPER NO. 358	VEGETATIVE MGMT	SOUTHERN FOREST	X	X	X	-	B
POWELL, JEFF	ET AL	1983					
RANGELAND WATERSHED WATER BUDGET AND GRAZING CATTLE WASTE NUTRIENT CYCLING							
US ENVIRONMENTAL PROTECTION AGENCY, EPA-600/S2-83-017							
PAPER NO. 409	GRAZING SYSTEM	TALLGRASS PRAIRIE	X	X	X	X	-
RHOADES, EDD D.	ET AL	1964					
WATER INTAKE ON SANDY RANGE AFFECTED BY 20 YRS OF DIFFERENTIAL CATTLE STOCKING							
JOURNAL OF RANGE MANAGEMENT 17(4):185-190							
PAPER NO. 420	GRAZING SYSTEM	PLAINS GRASSLANDS	-	-	-	-	-
SPEAKE, D. W.	ET AL	1975					
ASPECTS OF LAND MGMT WITH REGARD TO PRODUCTION OF WOOD & WILDLIFE SE U.S.							
4TH NORTH AMERICAN FOREST SOILS CONF PROC:333-349							
PAPER NO. 343	-	-	X	X	X	-	B
STRANSKY, JOHN J.	HALLS, LOWELL K.	1980					
FORAGE AND PINE GROWTH WITH CLEARCUTTING AND SITE PREPARATION							
USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:343-348							
PAPER NO. 353	VEGETATIVE MGMT	-	X	X	-	-	-

FORAGE MODEL - CITATIONS FOR REGIONS 8 AND 9

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
THILL, RONALD E.	WOLTERS, GALE L.	1979					
CATTLE PRODUCTION ON A SOUTHERN PINE-HARDWOOD FOREST							
RANGELANDS 1(2):60-61							
PAPER NO. 359	VEGETATIVE MGMT	SOUTHERN FOREST	X	X	-	-	B,C
TYGER RANGER DISTRICT		UNKWN					
WATERSHED IMPROVEMENT PROGRAM, PROJECT COST-EFFECTIVENESS ANALYSIS							
FRANCIS MARION & SUMTER NATIONAL FOREST, REGION 8							
PAPER NO. 692	FOREST REPORT	-	-	-	-	-	B,C,B/C
VAN DERSAL, WILLIAM R.		UNKWN					
THE DEPENDENCE OF SOILS ON ANIMAL LIFE							
2ND NORTH AMERICAN WILDLIFE CONF:458-467							
PAPER NO. 340	-	-	-	-	-	-	-
VARIOUS		1986					
FOREST REPORT							
CHATTAHOOCHEE-OCONEE NATIONAL FOREST, REGION 8							
PAPER NO. 682	FOREST REPORT	-	-	X	-	-	B,C,B/C
WERTZ, WILLIAM A.		1965					
INTERPRETATION OF SOIL SURVEYS FOR WILDLIFE MANAGEMENT							
THE AMERICAN MIDLAND NATURALIST 75(1):221-231							
PAPER NO. 341	-	-	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
WOLTERS, GALE L. 1973 SOUTHERN PINE OVERSTORIES INFLUENCE HERBAGE QUALITY JOURNAL OF RANGE MANAGEMENT 26(6):423-426 PAPER NO. 364	VEGETATIVE MGMT	SOUTH PINE BLUESTEM	X	X	-	-	
WOOD, GENE W. 1986 INFLUENCES OF FOREST FERTILIZATION ON SOUTH CAROLINA DEER FORAGE QUALITY SOUTHERN JOURNAL OF APPLIED FORESTRY 10:203-205 PAPER NO. 345	FERTILIZATION	-	X	X	-	-	-

FORAGE MODEL - CITATIONS FOR UNSPECIFIED GEOGRAPHIC REGION

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
BARTLETT, E. T. 1984 ESTIMATING BENEFITS OF RANGE FOR WILDLAND MANAGEMENT AND PLANNING VALUATION OF WLDLND RESOURCE BENEFITS. WESTVIEW PRESS BOULDER, CO, 1984:143-55 PAPER NO. 379	GENERAL PAPER	-	-	-	-	-	B,C
BRNA, PAUL 1977 FOREST MANAGEMENT BENEFITS VALUATION, A BIBLIOGRAPHY USDI, BUREAU OF LAND MANAGEMENT, TECHNICAL NOTE 302 PAPER NO. 735	ECONOMIC ANALYSIS	-	-	-	-	-	B
CHAKRAVARTY, SHRI M. K. 1978 ECONOMICS OF WATERSHED MANAGEMENT JOURNAL OF SOIL AND WATER CONSERVATION IN INDIA 28(1-4):69-75 PAPER NO. 736	ECONOMIC ANALYSIS	-	-	-	-	-	-
DESVOUSGES, WILLIAM H. SKAHEN, VENETIA A. 1985 TYPE B TECHNICAL INFORMATION DOCUMENT: TECHNIQUES TO MEASURE DAMAGES TO NATURA RESEARCH TRIANGLE INSTITUTE PROJECT 3142-05DR PAPER NO. 745	ECONOMIC ANALYSIS	-	-	-	-	-	-
LAYCOCK, WILLIAM A. 1982 SEEDING AND FERTILIZING TO IMPROVE HIGH-ELEVATION RANGELANDS USFS INT-120 GENERAL TECHNICAL REPORT PAPER NO. 333	RANGE REHABILITATION	HI-ELEVATION RNGLNDS	X	X	-	-	-

FORAGE MODEL - CITATIONS FOR UNSPECIPIED GEOGRAPHIC REGION

CITATION	PRACTICE	RANGE TYPE	POUNDS PORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
LEWIS, CLIFFORD E.		1972					
CHOPPING AND WEBBING CONTROL SAW-PALMETTO IN SOUTH FLORIDA							
USFS SE-177 RESEARCH NOTE							
PAPER NO. 328	RANGE REHABILITATION	LONGLEAP-SLASH PINE	-	-	-	-	-
LUSBY, GREGG C.		1970					
HYDROLOGIC & BIOTIC EPPECTS OP GRAZING VS. NON-GRAZING NEAR GRAND JUNCTION, CO							
JOURNAL OP RANGE MANAGEMENT 3:256-260							
PAPER NO. 416	GRAZING SYSTEM	DESERT SHRUB	-	-	-	-	-
MCCORKLE, C. O., JR.		1957					
APPLIC OP LINEAR PROGRAM TO RESEARCH IN ECONOMICS OP RANGE IMPROVE/UTILIZATION							
COMMITTEE ON ECON OP RNG USE & DEVELOP OP W AGRIC ECON RESEARCH COUNCIL, RPT 1							
PAPER NO. 380	GENERAL PAPER	-	-	-	-	-	B,C
NIELSEN, DARWIN B.		1984					
ECONOMIC PACTORS TO BE CONSIDERED IN SAGEBRUSH/GRASSLAND MANAGEMENT							
DEVELOPING STRATEGIES FOR RANGELAND MANAGEMENT							
PAPER NO. 377	RANGE REHABILITATION	SAGEBRUSH	X	X	X	X	B,C,IRR
RIITTERS, K.	BRODIE, J. D.	1983					
DYNAMIC PROGRAMMING POR OPTIMIZATION OF FORAGE AND WOOD FIBER PRODUCTION							
OR ST UNIV, COLLEGE OP AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:325-327							
PAPER NO. 381	GENERAL PAPER	-	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	POUNDS FORAGE	INDUCED RESOURCE OUTPUT	CONVERSION TO NUMBER ANIMALS	INDUCED NUMBER ANIMALS	ECONOMICS
THILENIUS, JOHN P. 1975 ALPINE RANGE MGMT IN WESTERN UNITED STATES - PRINCIPLES, PRACTICES & PROBLEMS USFS RM-157 RESEARCH PAPER PAPER NO. 402	MULTIPLE	ALPINE RANGE	X	-	-	-	-
TOWNSEND, JOSEPH E. (ED) SMITH, ROBERT J. (ED) 1977 IMPROVING FISH AND WILDLIFE BENEFITS IN RANGE MANAGEMENT US DEPT OF THE INTERIOR, FWS/OBS-77/1 PAPER NO. 351	GENERAL PAPER	-	-	-	-	-	-
WELLS, CAROL G. ET AL 1978 EFFECTS OF FIRE ON SOIL, A STATE-OF-KNOWLEDGE REVIEW USFS WO-7 GENERAL TECHNICAL REPORT PAPER NO. 729	GENERAL WATERSHED MGMT	-	-	-	-	-	-
WOOD, M. KARL BLACKBURN, WILBERT H. 1981 GRAZING SYSTEMS: THEIR INFLUENCE ON INFILTRATION RATES IN ROLLING PLAINS OF TX JOURNAL OF RANGE MANAGEMENT 34(4):331-335 PAPER NO. 418	GRAZING SYSTEM	-	-	-	-	-	-

CITATIONS FOR ROAD MODEL

ROAD MODEL - CITATIONS FOR ALL REGIONS

CITATION	PRACTICE	RANGE TYPE	CONSTRUCTION COST	MAINTENANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
ADAMS, PAUL W.	ET AL	1986					
ESTIM STREAMPLOWS ON SMALL PORESTED WATERSHEDS POR CULVERT/BRIDGE DESIGN IN OR							
OREGON STATE UNIV, COLLEGE OF PORESTRY, RESEARCH BULLETIN 55							
PAPER NO. 673	ROAD CULVERTS	-	-	-	-	X	-
AMARANTHUS, MICHAEL P.	ET AL	1985					
LOGGING & FOREST ROADS RELATED TO INCREASED DEBRIS SLIDES IN SOUTHWEST OREGON							
JOURNAL OF PORESTRY 83(4):229-233							
PAPER NO. 660	ROAD LOCATION	-	-	-	-	-	-
ANDERSON, HENRY W.	ET AL	1986					
PORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY							
USFS PSW-18 GENERAL TECHNICAL REPORT							
PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
ANDERSON, PAUL	SESSIONS, JOHN	1986					
GRADEABILITY & COST CONSIDERATIONS IN VEHICLE OPERATIONS ON STEEP ROADS							
IMPROV MTN LOGGING PLANNING TECH & HARDWARE: JOINT SYMP, IUFRO MNT LOG SECTION							
PAPER NO. 658	ROAD LOCATION	-	X	-	X	-	C
APACHE/SITGREAVES N.F.	-	1984					
THREE FORKS ROAD NO. 249 RECONSTRUCTION							
USFS REGION 3							
PAPER NO. 700	FOREST REPORT	-	-	-	-	-	B,C

ROAD MODEL - CITATIONS FOR ALL REGIONS

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
BETHLAHMY, NEDAVIA KIDD, W. JOE, JR. 1966 CONTROLLING SOIL MOVEMENT FROM STEEP ROAD FILLS USFS INT-45 RESEARCH NOTE PAPER NO. 654	SLOPE REVEGETATION	-	-	-	-	-	-
BLOSSER, RUSSELL O. 1984 FORESTRY MANAGEMENT PRACTICES & CUMULATIVE EFFECTS ON WATER QUALITY & UTILITY NATL COUNCIL OF PAPER INDUSTRY FOR AIR & STREAM IMPROV, INC, TECH BULLETIN 435 PAPER NO. 427	GENERAL PAPER	-	-	-	-	X	-
BROWN, GEORGE W. KRYGIER, JAMES T. 1971 CLEAR-CUT LOGGING AND SEDIMENT PRODUCTION IN THE OREGON COAST RANGE WATER RESOURCES RESEARCH 7(5):1189-1198 PAPER NO. 480	LOGGING SYSTEM	FORESTED	-	-	-	-	-
BROZKA, ROBERT J. 1982 EFFECTS OF TIMBER HARVESTING & ASSOC ROADS ON WATER QUALITY & MGMT PRACTICES NEW MEXICO SOIL & WATER CONSERVATION DIVISION, CONTRACT 70-541-60, EXHIBIT B PAPER NO. 550	MULTIPLE	-	-	-	-	-	B,C
BURROUGHS, EDWARD R., JR. SUNDBERG, ERIC S. 1981 SURFACE EROSION FROM FOREST ROADS-A PROPOSED RES PROG USING SIMULATED RAINFALL USDA ARS WORKSHOP ON ESTIM EROSION & SED YLD ON RNGLNDS PROC, ARM-W-26:187-190 PAPER NO. 651	MULTIPLE	-	-	-	-	-	C

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
BURROUGHS, EDWARD R., JR. KING, JOHN G. 1985							
SURFACE EROSION CONTROL ON ROADS IN GRANITIC SOILS							
USFS ENGINEERING STAFF, WASHINGTON, D.C.							
PAPER NO. 656	MULTIPLE	-	-	-	-	-	-
CHAKRAVARTY, SHRI M. K. 1978							
ECONOMICS OF WATERSHED MANAGEMENT							
JOURNAL OF SOIL AND WATER CONSERVATION IN INDIA 28(1-4):69-75							
PAPER NO. 736	ECONOMIC ANALYSIS	-	-	-	-	-	-
CHEQUAMEGON NATIONAL FORE 1987							
FOREST REPORT							
USFS REGION 9							
PAPER NO. 684	FOREST REPORT	-	-	-	-	X	B,C
CLARK, ROGER N. ET AL 1985							
INFLU FOR/RNG MGT ON ANADRO FISH HABITAT WEST N. AMERICA: INFLU OF RECREATION							
USFS PNW-178 GENERAL TECHNICAL REPORT							
PAPER NO. 574	RECREATION	RIPARIAN & AQUATIC	-	-	-	-	-
CLINE, LEO D. ET AL 1983							
EFFECTS OF HIGHWAY CONSTRUCT ON WATER QUAL & BIOTA IN ADJACENT COLO MTN STREAM							
USFS RM-429 RESEARCH NOTE							
PAPER NO. 549	ROADS	RIPARIAN	-	-	-	-	-

ROAD MODEL - CITATIONS FOR ALL REGIONS

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
COOK, WALTER L., JR. HEWLETT, JOHN D. 1979 THE BROAD-BASED DIP ON PIEDMONT WOODS ROADS SOUTHERN JOURNAL OF APPLIED FORESTRY 3(3):77-81 PAPER NO. 653	ROAD LOCATION	-	X	-	-	-	B
CORANADO NATIONAL FOREST 1986 MEMO AND REPORT OF WASHINGTON CAMPERFO PROJECT USFS REGION 3 PAPER NO. 696	FOREST REPORT	RIPARIAN	X	-	-	-	C
DISSMEYER, GEORGE E. COST, NOEL D. 1984 MULTIRESOURCE INVENTORIES: WATERSHED CONDITION OF COMMERCIAL FOREST LAND IN SC USFS SE-247 RESEARCH PAPER PAPER NO. 722	GENERAL WATERSHED MGMT	-	-	-	-	-	-
FREDRIKSEN, R. L. 1970 EROSION & SEDIMENT FOLLOW ROAD CONSTRUCT/TIMBER HARVEST UNSTABLE SOILS...W. OR USFS PNW-104 RESEARCH PAPER PAPER NO. 665	MULTIPLE	-	-	-	-	-	-
FROEHLICH, H. A. ET AL 1985 SOIL BULK DENSITY RECOVERY ON COMPACTED SKID TRAILS IN CENTRAL IDAHO SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 49(4) PAPER NO. 666	GENERAL	-	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
GOLDEN, MICHAEL S. ET AL 1984 FORESTRY ACTIVITIES & WATER QUALITY IN ALABAMA: EFFECTS, RECOMMENDED PRACTICES ALABAMA AGRICULTURAL EXPERIMENT STATION, AUBURN UNIV, AL, BULLETIN 555 PAPER NO. 452	MULTIPLE	-	-	-	-	-	-
GROVES, FRANKLIN D. ET AL 1979 TIMBER HAUL ROAD CONSTRUCTION IN SOUTHERN MOUNTAINS SOUTHERN JOURNAL OF APPLIED FORESTRY 3(3):68-76 PAPER NO. 652	MULTIPLE	-	X	-	-	-	C
HARR, R. DENNIS 1983 POTENTIAL FOR AUGMENTING WATER YIELD THROUGH FOREST PRACTICES IN W. WA/W. OR WATER RESOURCES BULLETIN 19(3):383-393 PAPER NO. 499	-	-	-	-	-	-	-
HAUPT, HAROLD F. 1959 ROAD & SLOPE CHARACTERISTICS AFFECTING SEDIMENT MOVEMENT FROM LOGGING ROADS JOURNAL OF FORESTRY 57(5):329-332 PAPER NO. 659	ROAD LOCATION	-	-	-	-	-	-
HAUPT, HAROLD F. 1959 A METHOD FOR CONTROLLING SEDIMENT FROM LOGGING ROADS USFS INT MISCELLANEOUS PUBLICATION 22 PAPER NO. 674	-	-	-	X	-	-	-

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
HEEDE, BURCHARD H. 1984 OVERLAND FLOW & SEDIMENT DELIVERY: EXP WITH SMALL SUBDRAINAGE IN SW PONDEROSA JOURNAL OF HYDROLOGY 72:261-273 PAPER NO. 548	ROADS	FORESTED	-	-	-	-	-
HIAWATHA NATIONAL FOREST 1987 FOREST REPORT USFS REGION 9 PAPER NO. 687	FOREST REPORT	-	-	X	-	X	B,C,B/C
JACKSON, DAVID H. LOVELESS, ROBERT 1986 PREDICTING FOREST ROAD AND BRIDGE CONSTRUCTION COSTS WESTERN JOURNAL OF APPLIED FORESTRY 1(3):76-79 PAPER NO. 670	MULTIPLE		X	-	-	-	C
KELLER, GORDON 1985 ROAD TIPS, A COMPILATION OF REPORTS FROM THE ROAD TECHNOLOGY IMPROVEMENT PROG USFS ENGINEERING STAFF, WASHINGTON, D.C. PAPER NO. 655	ROAD SURFACING	-	-	-	X	X	-
KOCHENDERFER, J. N. WENDEL, G. W. 1980 COSTS & ENVIRON IMPACTS OF HARVESTING TIMBER IN APPALACHIA WITH TRUCK-MOUNTED USFS NE-456 RESEARCH PAPER PAPER NO. 741	LOGGING SYSTEM	-	X	-	-	-	C

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
KOCHENDERFER, J. N.	HELVEY, J. D.	1982					
PROGRESS REPORT I - SOIL LOSS & UTILITY EVALUATION OF FOREST ACCESS ROAD IN WV							
USFS NE 4300-FS-NE-1602-45							
PAPER NO. 546	ROADS	FORESTED	-	-	-	-	-
KOCHENDERFER, J. N.	ET AL	1984					
COST OF/SOIL LOSS ON "MIN-STD" FOREST TRUCK RDS CONSTRUCTED CTRL APPALACHIANS							
USFS NE-544 RESEARCH PAPER							
PAPER NO. 657	MULTIPLE	-	X	-	-	-	-
KOCHENDERFER, J. N.	HELVEY, J. D.	UNKWN					
GRAVEL GREATLY REDUCES SOIL LOSSES FROM MINIMUM-STANDARD FOREST ROADS							
USFS NE FOREST EXPERIMENT STATION, DRAFT							
PAPER NO. 667	ROAD SURFACING	-	-	-	-	-	-
KOCHENDERFER, JAMES N.		1970					
EROSION CONTROL ON LOGGING ROADS IN THE APPALACHIANS							
USFS NE-158 RESEARCH PAPER							
PAPER NO. 662	ROAD LOCATION		-	-	-	-	-
KOCHENDERFER, JAMES N.		1986					
FOREST REPORT							
USFS NE PROJECT-4301							
PAPER NO. 671		-	X	-	X	-	-

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
LEAF, CHARLES F. 1974 MODEL FOR PREDICTING EROSION & SEDIMENT YIELD FROM SECONDARY FOREST ROAD CONST USFS RM-274 RESEARCH NOTE PAPER NO. 650	MULTIPLE	-	X	-	-	-	-
LULL, HOWARD W. REINHART, KENNETH G. 1972 FORESTS AND FLOODS IN THE EASTERN UNITED STATES USFS NE-226 RESEARCH PAPER PAPER NO. 429	GENERAL PAPER	-	-	-	-	-	-
LYNCH, JAMES A. ET AL 1985 BEST MGMT PRACTICES FOR CONTROL NONPT-SOURCE POLLUTION ON FORESTED WATERSHEDS JOURNAL OF SOIL AND WATER CONSERVATION 40(1):164-167 PAPER NO. 455	-	FORESTED	-	-	-	-	-
MEYER, G. J. ET AL 1975 SEDIMENT YIELDS FROM ROADSIDES: APPLICATION OF UNIVERSAL SOIL LOSS EQUATION JOURNAL OF SOIL AND WATER CONSERVATION (NOV-DEC 1985):289-292 PAPER NO. 545	ROADS		-	-	-	-	-
MILES, PATRICK D. 1983 ASSESS ECON IMPLICATIONS OF MANAGING NONPT FORESTRY SOURCE OF WATER POLLUTANTS MASTER OF SCIENCE DEGREE, COLLEGE OF FORESTRY, UNIV OF MINNESOTA (OCTOBER) PAPER NO. 449	MULTIPLE	-	-	-	-	-	B,C,B/C

CITATION	PRACTICE	RANGE TYPE		CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
OBERTS, GARY L.			1986					
POLLUTANTS ASSOCIATED WITH SAND AND SALT APPLIED TO ROADS IN MINNESOTA								
WATER RESOURCES BULLETIN 22(3):479-483								
PAPER NO. 547	ROADS	-		-	-	-	-	-
OTTAWA NATIONAL FOREST			1987					
FOREST REPORT								
USFS REGION 9								
PAPER NO. 681	FOREST REPORT	-		X	-	-	-	B,C,B/C
PACKER, PAUL E.			1967					
CRITERIA FOR DESIGNING AND LOCATING LOGGING ROADS TO CONTROL SEDIMENT								
FOREST SCIENCE 13(1):2-18								
PAPER NO. 649	MULTIPLE	-		X	-	-	-	-
PRESCOTT NATIONAL FOREST			1987					
POLAND CREEK BRIDGE - STUDY SUMMARY AND WORKSHEET								
USFS REGION 3								
PAPER NO. 697	FOREST REPORT	-		X	-	X	-	-
ROBISON, M. HENRY	HORMAECHEA, DANIEL T.		1986					
POTENTIAL EMPLOYMENT IMPACT OF ANADROMOUS FISH HABITAT MGT ON PAYETTE NATL FOR								
USFS PAYETTE NATIONAL FOREST, MCCALL, IDAHO								
PAPER NO. 566	MULTIPLE	RIVER		-	-	-	-	B.C

ROAD MODEL - CITATIONS FOR ALL REGIONS

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
SCHULTZ, BOB PLUMAS NATIONAL FOREST 1987 POCO CREEK RESTORATION PROJECT: BECKWOURTH RANGER DISTRICT USFS PLUMAS NATIONAL FOREST PAPER NO. 715	HABITAT IMPROVEMENT	-	X	-	-	-	B,C,B/C
SESSIONS, JOHN 1986 CAN INCOME TAX RULES AFFECT MANAGEMENT STRATEGIES FOR FOREST ROADS? WESTERN JOURNAL OF APPLIED FORESTRY 1(1):26-28 PAPER NO. 672	-	-	X	X	X	X	-
STONE, EARL 1977 THE IMPACT OF TIMBER HARVEST ON SOILS AND WATER USFS REPORT OF THE PRESIDENT'S ADVISORY ON TIMBER & THE ENVIRONMENT, APR 1973 PAPER NO. 497	LOGGING SYSTEM	-	-	-	-	-	C
STOWELL, RICK ET AL UNKWN A USERS GUIDE FOR THE FISHSED HSI MODEL USFS NORTHERN REGION PAPER NO. 584	GENERAL	STREAM	-	-	-	-	-
SULLIVAN, KATHLEEN 1985 LONG-TERM PATTERN OF WTR QUAL IN MANAGED WATERSHED IN OR: 1. SUSPEND SEDIMENT WATER RESOURCES BULLETIN 21(6):977-987 PAPER NO. 477	LOGGING SYSTEM	FORESTED	-	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
SUPERIOR NATIONAL FOREST -		1986					
FLINTLOCK TIMBER SALE ROAD							
USFS SUPERIOR NATIONAL FOREST							
PAPER NO. 710	FOREST REPORT	-	X	X	X	X	-
SUPERIOR NATIONAL FOREST		1987					
FOREST REPORT							
USFS REGION 9							
PAPER NO. 685	FOREST REPORT	-	X	-	X	X	
SWIFT, L. W., JR.		1982					
GRAVEL AND GRASS SURFACING REDUCES SOIL LOSS FROM MOUNTAIN ROADS							
USFS SE, COWEETA HYDROLOGIC LAB							
PAPER NO. 544	ROADS	-	-	-	-	-	-
SWIFT, LLOYD W., JR.		UNKWN					
FILTER STRIP WIDTHS FOR FOREST ROADS IN THE SOUTHERN APPALACHIANS							
USFS SE FOREST EXPERIMENT STATION							
PAPER NO. 663	MULTIPLE	-	-	-	X	X	-
TEW, HOWARD C.	ET AL	1985					
LAYMAN'S GUIDE TO PRIVATE ACCESS ROAD CONSTRUCTION IN SOUTHERN APPALACHIAN MTN							
USDA SCS, FS, TVA. COPIES AVAIL FROM LOCAL SOIL & WATER CONS DISTRICT OFFICES							
PAPER NO. 648	MULTIPLE		X	-	-	-	-

ROAD MODEL - CITATIONS FOR ALL REGIONS

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
TRIMBLE, GEORGE R., JR. WEITZMAN, SIDNEY 1953 SOIL EROSION ON LOGGING ROADS SOIL SCIENCE SOCIETY PROC:152-154 PAPER NO. 543	ROADS	-	-	-	-	-	
TRIMBLE, GEORGE R., JR. SARTZ, RICHARD S. 1957 HOW FAR FROM A STREAM SHOULD A LOGGING ROAD BE LOCATED? JOURNAL OF FORESTRY 55(MAY):339-341 PAPER NO. 661	ROAD LOCATION	-	-	-	-	-	-
USDA SOIL CONS SERVICE 1985 HAUL ROADS SOIL POTENTIAL RATINGS USDA SOIL CONSERVATION SERVICE, ORONO, MAINE PAPER NO. 668	-	-	X	-	-	-	C
USFS ENGINEER STAFF (ED) 1985 ROAD TIPS, A COMPILATION OF REPORTS FROM THE ROAD TECHNOLOGY IMPROVEMENT PROG USFS ENGINEERING STAFF, WASHINGTON, D.C. PAPER NO. 669	MULTIPLE	-	X	X	X	X	-
USFS NORTHEASTERN EXP STA 1986 FOREST REPORT USFS NE FOREST EXPERIMENT STATION PAPER NO. 702	FOREST REPORT	WATERSHED	X	X	X	X	B,C,B/C

CITATION	PRACTICE	RANGE TYPE	CONSTRUC-TION COST	MAINTEN-ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
USFS NORTHEASTERN REGION 1982 ECONOMIC ANALYSIS OF THE COOPERATIVE FOREST MANAGEMENT PROGRAM IN NEW YORK USFS NORTHEASTERN REGION PAPER NO. 708	FOREST REPORT	-	-	-	-	-	-
VARIOUS 1986 FOREST REPORT CHATTAHOOCHEE-OCONEE NATIONAL FOREST, REGION 8 PAPER NO. 682	FOREST REPORT		X	X	X	X	B,C,B/C
WARRINGTON, GORDON E. UNKWN ESTIMATING SOIL EROSION FOR FOREST LAND MANAGEMENT PLANNING: A PROCEDURE USFS RM, FORT COLLINS, COLORADO PAPER NO. 542	MULTIPLE	FORESTED	-	-	-	-	-
WILSON, C. N. 1972 PROCEDURE FOR DETERMINING THE LEVEL OF SOIL & WATER DAMAGE PREVENTION MEASURES USFS DIVISION OF SOILS AND WATERSHED MANAGEMENT, REGION 9 PAPER NO. 720	SOIL-WATER ECONOMICS	-	-	-	-	-	B,C,B/C
WOLFE, MITCHELL D. WILLIAMS, JOHN W. 1986 RATES OF LANDSLIDING AS IMPACTED BY TIMBER MGMT ACTIVITIES IN NW CALIFORNIA BULLETIN OF ASSOC OF ENGINEERING GEOLOGISTS XXIII(1):53-60 PAPER NO. 664	ROAD LOCATION	-	X	-	-	-	-

CITATION	PRACTICE	RANGE TYPE	CONSTRUC- TION COST	MAINTEN- ANCE COST	CONSTRUCT INCREMENT	MAINTEN INCREMENT	ECONOMICS
YOHO, NOEL S.		UNKWN					
FOREST MANAGEMENT AND SEDIMENT PRODUCTION IN THE SOUTH - A REVIEW							
SOUTHERN JOURNAL OF APPLIED FORESTRY:27-35							
PAPER NO. 457	LOGGING SYSTEM	FORESTED	-	-	-	-	-

CITATIONS FOR TIMBER MODEL

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
ANDERSON, HENRY W. ET AL 1986 FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
ATKINSON, W. A. MORISON, I. G. 1973 PACIFIC NW REGION FERTILIZATION PROJ, INTEGRATED APPROACH TO FOREST NUTRITION 4TH NORTH AMERICAN FOREST SOILS CONF PROC:477-484 PAPER NO. 124	FERTILIZATION		X	-	-	-	-
ATZET, THOMAS AMARANTHUS, MIKE 1985 SOIL MOISTURE RETENTION PROGRAM USFS REGION 6, SISKIYOU NATIONAL FOREST R6-ECOL-209-1986 PAPER NO. 703	FOREST REPORT	-	X	-	-	-	-
BAILEY, ARTHUR W. HINES, WILLIAM W. 1971 VEGETATION-SOIL SURVEY OF WILDLIFE-FORESTRY RESEARCH AREA, APPLICATION TO MGMT OREGON STATE GAME COMMISSION, W-51-R, GAME REPORT 2 PAPER NO. 335	MULTIPLE	-	-	-	-	-	-
BARCLAY, H. J. HALL, T. H. 1986 SHAWN: A MODEL OF DOUG-FIR ECOSYSTEM RESPONSE TO N FERTILIZATION AND THINNING CANADIAN FORESTRY SERVICE, PACIFIC FORESTRY CENTRE, INFORMATION RPT BC-X-280 PAPER NO. 131	FERTILIZATION	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR DOUGLAS FIR

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
BIGGER, C. MOLLIE COLE, DALE W. 1983 EFFECTS OF HARVESTING INTENSITY ON NUTRIENT LOSS AND FUTURE PRODUCTIVITY USFS PNW-163 GENERAL TECHNICAL REPORT:167-178 PAPER NO. 136	LOGGING SYSTEM	-	X	-	-	-	-
BROWN, GEORGE W. KRYGIER, JAMES T. 1970 EFFECTS OF CLEAR-CUTTING ON STREAM TEMPERATURE WATER RESOURCES RESEARCH 6(4):1133-1139 PAPER NO. 556	LOGGING SYSTEM	-	-	-	-	-	-
CARMEAN, WILLARD H. 1954 SITE QUALITY DOUG-FIR IN SW WA & RELATION TO PRECIP, ELEV, PHYS SOIL PROP SOIL SCIENCE SOCIETY OF AMERICA PROC 18(1954):330-334 PAPER NO. 141	-	-	-	-	-	-	-
CARMEAN, WILLARD H. 1975 FOREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	-	-	-	-	-	-	-
CLAYTON, JAMES L. 1981 SOIL DISTURBANCE CAUSED BY CLEARCUTTING & HELICOPTER YARDING-IDAHO BATHOLITH USFS INT-305 RESEARCH NOTE PAPER NO. 119	LOGGING SYSTEM	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
COLE, DANA W. 1983 SKID TRAIL PRECONSTRUCTION; CASE STUDY OF LOGGING IMPACTS & PRODUCTIVITY CA DEPT FORESTRY, FORESTRY NOTE #86 (MAY 1983) PAPER NO. 128	SKID TRAILS	-	-	-	-	-	-
DISSMEYER, GEORGE E. FOSTER, BENNETT 1987 SOME ECONOMIC BENEFITS OF PROTECTING WATER QUALITY (IN A PROCEEDINGS) USFS SO-65 GENERAL TECHNICAL REPORT PAPER NO. 289	MULTIPLE	-	X	-	-	-	B,C,B/C,IRR
DYRNESS, C. T. 1967 SOIL SURFACE CONDITIONS FOLLOWING SKYLINE LOGGING USFS PNW-55 RESEARCH NOTE PAPER NO. 121	LOGGING SYSTEM	-	-	-	-	-	-
DYRNESS, C. T. 1972 SOIL SURFACE CONDITIONS FOLLOWING BALLOON LOGGING USFS PNW-182 RESEARCH NOTE PAPER NO. 120	LOGGING SYSTEM	-	-	-	-	-	-
ENTRY, JAMES A. ET AL 1986 EFFECT OF TIMBER HARVESTING ON MICROBIAL BIOMASS FLUXES IN NORTHERN ROCKY MTN CANADIAN JOURNAL OF FOREST RESEARCH 16(1986):1076-1081 PAPER NO. 285	LOGGING SYSTEM	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR DOUGLAS FIR

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
FELLER, M. C. ET AL 1983 FORCYTE-10: CALIB DATA & SIMUL OF POTENTIAL LONG-TERM EFFECT INTENSIVE FOR MGT USFS PNW-163 GENERAL TECHNICAL REPORT PAPER NO. 145	MULTIPLE	-	-	-	-	X	B/C
FELLER, M. C. KIMMINS, J. P. 1984 EFFECTS CLEARCUT/SLASH BURNING ON STREAMWATER CHEM & WATERSHED NUTRIENT BUDGET WATER RESOURCES RESEARCH 20(1):29-40 PAPER NO. 478	LOGGING SYSTEM	-	-	-	-	-	-
FISKE, JOHN N. 1984 ESTIM EFFECT OF COMPETING PLANTS ON CONIFER GRWTH/YIELD-DETERMIN RELEASE NEEDS 6TH ANNUAL FOREST VEGETATION MANAGEMENT CONF PROC:129-143 PAPER NO. 249	COMPETITOR CONTROL	-	-	-	-	-	-
FREDRIKSEN, R. L. 1970 EROSION & SEDIMENT FOLLOW ROAD CONSTRUCT/TIMBER HARVEST UNSTABLE SOILS...W. OR USFS PNW-104 RESEARCH PAPER PAPER NO. 665	MULTIPLE	-	-	-	-	-	-
FREDRIKSEN, R. L. ET AL 1973 IMPACT TIMBER HARVEST, FERTIL & HERBICIDE TREAT ON STREAMWATER QUAL: W OR & WA 4TH NORTH AMERICAN FOREST SOILS CONF PROC:283-313 PAPER NO. 479	LOGGING SYSTEM	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
FROEHLICH, H. A. MCNABB, D. H. 1984 MINIMIZING SOIL COMPACTION IN PACIFIC NORTHWEST FORESTS 6TH NORTH AMERICAN FOREST SOILS CONF PROC:159-192 PAPER NO. 114	SKID TRAILS	-	X	-	-	-	-
FROEHLICH, HENRY A. UNKWN EFFECT OF SOIL COMPACTION BY LOGGING ON FOREST PRODUCTIVITY BLM, CONTRACT # 53500-CT4-5(N), PORTLAND, OR PAPER NO. 127	SKID TRAILS	-	X	X	-	-	-
GESSEL, S. P. ATKINSON, W. A. 1984 USE OF FERTILIZERS IN SUSTAINED PRODUCTIVITY OF DOUGLAS-FIR FORESTS 6TH NORTH AMERICAN FOREST SOILS CONF PROC:67-87 PAPER NO. 115	FERTILIZATION	-	-	-	X	-	B,C,B/C
GESSEL, STANLEY P. LLOYD, WILLIAM J. 1950 EFFECT OF SOME PHYSICAL SOIL PROPERTIES ON DOUGLAS-FIR SITE QUALITY JOURNAL OF FORESTRY 48(6):405-410 PAPER NO. 140		-	-	-	-	-	-
GILLICK, THOMAS SCOTT, BILLY DEAN 1975 BUFFER STRIPS AND THE PROTECTION OF FISHERY RESOURCES: AN ECONOMIC ANALYSIS STATE OF WASHINGTON, DEPT OF NATURAL RESOURCES, DNR REPORT 32 PAPER NO. 580	LOGGING SYSTEM	-	-	-	-	-	B,C,B/C

TIMBER MODEL - CITATIONS FOR DOUGLAS FIR

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
GORDON, JOHN C. DURYEA, MARY L. 1984 INCREASING FOREST PRODUCTIVITY & VALUE THROUGH IMPROVED REGENERATION PRACTICES FOREST POTENTIALS - WEYERHAEUSER SCIENCE SYMPOSIUM (1984):131-145 PAPER NO. 135	MULTIPLE	-	X	-	-	-	-
HARVEY, A. E. ET AL 1983 EFFECTS OF SOIL ORGANIC MATTER ON REGENERATION IN NORTHERN ROCKY MTN FORESTS USFS PNW-163 GENERAL TECHNICAL REPORT:239-242 PAPER NO. 132	-	X	X	-	-	-	-
HELMS, JOHN A. 1983 SOIL COMPACTION AND STAND GROWTH, FINAL REPORT TO USDA FOREST SERVICE USFS AMENDMENT TO SUPPLEMENT 42, MASTER AGREEMENT 21-395 PAPER NO. 134	MULTIPLE	-	X	-	X	-	-
HIBBERT, ALDEN R. 1979 MANAGING VEGETATION TO INCREASE FLOW IN THE COLORADO RIVER BASIN USFS RM-66 GENERAL TECHNICAL REPORT PAPER NO. 510	VEGETATIVE MGMT	-	-	-	-	-	B,C
KLOCK, GLEN O. 1975 IMPACT OF FIVE POSTFIRE SALVAGE LOGGING SYSTEMS ON SOILS AND VEGETATION JOURNAL OF SOIL AND WATER CONSERVATION 30(2):78-81 PAPER NO. 113	LOGGING SYSTEM	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR DOUGLAS FIR

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
KNAPP, WALTER H. ET AL 1984 VEGETATION CONTROL FOR DOUGLAS-FIR REGENERATION ON SIUSLAW NATIONAL FOREST JOURNAL OF FORESTRY 82(3):168-173 PAPER NO. 133		X	-	-	-	-	C
LEAF, CHARLES F. 1975 WATERSHED MANAGEMENT IN ROCKY MOUNTAIN SUBALPINE ZONE: STATUS OF OUR KNOWLEDGE USFS RM-137 RESEARCH PAPER PAPER NO. 726	GENERAL WATERSHED MGMT	-	-	-	-	-	-
LEMMON, PAUL E. 1955 FACTORS AFFECT PRODUCTIVITY OF SOME LANDS IN WILLAMETTE BASIN OF OR: DOUG-FIR JOURNAL OF FORESTRY 53(5):323-330 PAPER NO. 143	-	-	-	-	-	-	-
MCDONALD, PHILIP M. 1986 GRASSES IN YOUNG CONIFER PLANTATIONS - HINDRANCE AND HELP NORTHWEST SCIENCE 60(4):271-278 PAPER NO. 367	VEGETATIVE MGMT	-	X	X	-	-	-
MCKAY, NEIL 1985 A STOCKABILITY EQUATION FOR FOREST LAND IN SISKIYOU COUNTY, CALIFORNIA USFS PNW-435 RESEARCH NOTE PAPER NO. 274	-	X	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR DOUGLAS FIR

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
MCLEAN, ALASTAIR 1983 PRODUCING FORAGE FOR LIVESTOCK ON FOREST RANGES OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:175-183 PAPER NO. 382	VEGETATIVE MGMT	X	X	-	-	-	-
MCLEAN, ALASTAIR 1983 CLASSIFICATION AND MANAGEMENT OF THE DOUGLAS-FIR-PINEGRASS REGION FORESTLAND GRAZING, SYMPOSIUM PROC, WASHINGTON STATE UNIV EXTENSION SVC:15-18 PAPER NO. 397	-	-	-	-	-	-	-
MILES, SCOTT R. POWERS, ROBERT F. 1983 FERTILIZING CALIFORNIA FORESTS WITH NITROGEN ... PRELIMINARY GUIDELINES USFS, REGION 5, (NOVEMBER 1983) PAPER NO. 77	FERTILIZATION	-	-	-	-	-	B,C,B/C
MILLER, RICHARD E. ET AL 1986 COMPARATIVE EFFECTS OF 3 N FERTILIZERS APPLIED IN FALL/SPRG TO 29-YR DOUG-FIR CANADIAN JOURNAL OF FOREST RESEARCH 16(1986):910-917 PAPER NO. 117	FERTILIZATION	-	-	-	-	-	-
MONSERUD, ROBERT A. 1984 HEIGHT GROWTH/SITE INDEX CURVES FOR INLAND DOUG-FIR BASED ON STEM ANALY DATA FOREST SCIENCE 30(4):943-965 PAPER NO. 137	-	-	-	-	X	-	-

TIMBER MODEL - CITATIONS FOR DOUGLAS FIR

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
MONSERUD, ROBERT A. 1985 COMPARISON OF DOUGLAS-FIR SITE INDEX & HEIGHT GROWTH CURVES IN PACIFIC NW CANADIAN JOURNAL OF FOREST RESEARCH 15(4-6):673-679 PAPER NO. 138	-	-	-	-	X	-	-
NEWMAN, HOWARD C. SCHMIDT, WYMAN C. 1979 SILVICULTURE AND RESIDUE TREATMENTS AFFECT WATER USED BY A LARCH/FIR FOREST USFS INT-90 GENERAL TECHNICAL REPORT PAPER NO. 496	LOGGING SYSTEM	-	-	-	-	-	-
PETERSON, C. E., JR. GESSEL, S. P. 1983 FOREST FERTILIZATION IN PACIFIC NW: RESULTS OF REGIONAL FOREST NUTRITION PROJ USFS PNW-163 GENERAL TECHNICAL REPORT PAPER NO. 123	FERTILIZATION	-	X	X	-	-	-
POWERS, ROBERT F. 1983 FOREST FERTILIZATION RESEARCH IN CALIFORNIA USFS PNW-163 GENERAL TECHNICAL REPORT PAPER NO. 84	FERTILIZATION	-	X	X	-	-	-
RADWAN, M. A. SHUMWAY, J. S. 1983 SITE INDEX & SELECTED SOIL PROPERTIES IN RELATION TO RESPONSE OF DOUGLAS-FIR 6TH NORTH AMERICAN FOREST SOILS CONF PROC:89-104 PAPER NO. 111	FERTILIZATION	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR DOUGLAS FIR

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
RICH, LOWELL R. THOMPSON, J. R. 1974 WATERSHED MANAGEMENT IN ARIZONA'S MIXED CONIFER FORESTS: STATUS OF OUR KNOWLED USFS RM-130 RESEARCH PAPER PAPER NO. 727	GENERAL WATERSHED MGMT	-	-	-	-	-	-
SCHMIDT, WYMAN C. 1979 UNDERSTORY VEGETATION RESPONSE TO HARVEST & RESIDUE MGMT IN LARCH/FIR FOREST USFS INT-90 GENERAL TECHNICAL REPORT:221-248 PAPER NO. 357	VEGETATIVE MGMT	-	-	-	-	-	-
SEDELL, JAMES R. FROGGATT, JUDITH L. 1984 IMPORTANCE OF STREAMSIDE FORESTS TO LARGE RIVERS: INSOLATION WILLAMETTE RVR... COPIES AVAILABLE UPON REQUEST PAPER NO. 606	-	-	-	-	-	-	-
SHARROW, S. H. LEININGER, W. C. 1983 SHEEP AS A SILVICULTURAL TOOL IN COASTAL DOUGLAS-FIR FOREST OREGON ST UNIV, AGR SCIENCES, SYMPOSIUM SERIES #2, FOOTHILLS FOR FOOD/FOREST PAPER NO. 126	COMPETITOR CONTROL	-	-	-	-	-	-
SIDLE, R. C. DRLICA, D. M. 1981 SOIL COMPACTION FROM LOGGING WITH LOW-GROUND PRESSURE SKIDDER IN OREGON COAST SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 45(1981):1219-1224 PAPER NO. 118	SKID TRAILS	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
SMITH, R. B. WASS, E. F. 1980 TREE GROWTH ON SKIDROADS ON STEEP SLOPES LOGGED AFTER WILDFIRES-BRIT.COLUMBIA CANADIAN FORESTRY SERVICE, PACIFIC FOREST RESEARCH CENTRE (NOV. 1980) PAPER NO. 116	SKID TRAILS	X	-	-	-	-	-
STEINBRENNER, E. C. 1963 INFLUENCE INDIVIDUAL SOIL & PHYSIOGRAPHIC FACTORS ON SITE INDEX OF DOUGLAS-FIR 2ND NORTH AMERICAN FOREST SOILS CONF PROC:261-277 PAPER NO. 139		-	-	-	-	-	-
STEWART, RONALD (COMPILER ET AL 1984 EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C
SULLIVAN, KATHLEEN 1985 LONG-TERM PATTERN OF WTR QUAL IN MANAGED WATERSHED IN OR: 1. SUSPEND SEDIMENT WATER RESOURCES BULLETIN 21(6):977-987 PAPER NO. 477	LOGGING SYSTEM	-	-	-	-	-	-
TAPPEINER II, J. C. ET AL 1986 PART 2, PACIFIC COAST, THE NEXT 30 YEARS - SILVICULTURE - THE PAST 30 YEARS JOURNAL OF FORESTRY 84(5):37-46 PAPER NO. 248	MULTIPLE	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR DOUGLAS FIR

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
TIEDEMANN, ARTHUR R. KLOCK, GLEN O. 1973 1ST-YR VEG AFTER FIRE, RESEEDING, FERTILIZATION ON ENTIAT EXPERIMENTAL FOREST USFS PNW-195 RESEARCH NOTE PAPER NO. 130	MULTIPLE	-	-	-	-	-	-
TURNER, JOHN LAMBERT, MARCIA J. 1978 S NUTRITION OF CONIFER RELATION TO RESPONSE TO FERTILIZER N, FUNGAL INFECTIONS 5TH NORTH AMERICAN FOREST SOILS CONF PROC:546-563 PAPER NO. 122	FERTILIZATION	-	-	X	-	-	-
UNIV. OF WASHINGTON FOREST RESOURCES COLLEGE 1982 REGIONAL FOREST NUTRITION RESEARCH PROJECT - BIENNIAL REPORT 1980-1982 INSTITUTE OF FOREST RESOURCES CONTRIBUTION NO. 46 PAPER NO. 112	FERTILIZATION	X	X	X	X	X	B,C,B/C
WERT, STEVE THOMAS, BYRON R. 1981 EFFECTS OF SKID ROADS ON DIAMETER, HEIGHT, VOLUME GROWTH IN DOUGLAS-FIR SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 45:629-632 PAPER NO. 125	SKID TRAILS	-	X	X	X	-	-
WILLIAMSON, R. L. 1963 GROWTH AND YIELD RECORDS FROM WELL-STOCKED STANDS OF DOUGLAS-FIR USFS PNW-4 RESEARCH PAPER PAPER NO. 144	-	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
WOOLDRIDGE, DAVID D. 1980 WATERSHED DISTURBANCE FROM TRACTOR AND SKYLINE CRANE LOGGING JOURNAL OF FORESTRY 58(5):369-372 PAPER NO. 129	LOGGING SYSTEM	-	-	-	-	-	-
ZINKE, PAUL J. 1958 SITE QUALITY DOUG-FIR/PONDEROSA PINE IN NW CA AS RELATED TO CLIMATE, TOPO,SOIL SOCIETY OP AMERICAN FORESTERS MEETING PROC (1958):167-171 PAPER NO. 142	-	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR JACK PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
ARMSON, K. A. ET AL 1975 FERTILIZATION RESPONSE IN THE NORTHERN CONIFEROUS FOREST 4TH NORTH AMERICAN FOREST SOILS CONF PROC:449-466 PAPER NO. 265	FERTILIZATION	-	-	X	-	-	-
BENZIE, JOHN W. 1977 JACK PINE IN THE NORTH CENTRAL STATES USFS NC-32 GENERAL TECHNICAL REPORT PAPER NO. 203	MULTIPLE	X	X	-	X	X	-
BUCHMAN, ROLAND G. 1983 SURVIVAL PREDICTIONS FOR MAJOR LAKE STATES TREE SPECIES USFS NC-233 RESEARCH PAPER PAPER NO. 212	-	X	X	-	-	-	-
CARMEAN, WILLARD H. 1975 FOREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	-	-	-	-	-	-	-
FOSTER, N. W. BEAUCHAMP, E. G. 1986 NITROGEN RELEASE FROM UREA & SULFUR-COATED UREA IN JACK PINE FOREST HUMUS SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 50(1):226-229 PAPER NO. 204	FERTILIZATION	-	-	-	-	-	C

TIMBER MODEL - CITATIONS FOR JACK PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
RAWINSKI, JOHN J. ET AL 1980 SOIL PROPERTIES RELATED TO CONIFEROUS SEEDLING HEIGHT GROWTH IN N. WISCONSIN USFS NC-254 RESEARCH NOTE PAPER NO. 213		-	X	-	-	-	-
ROSE, DIETMAR W. BRODIE, J. D. 1973 TIMBER INVESTMENT OPPORTUNITIES IN JACK PINE TYPE OF NORTHWESTERN WISCONSIN UNIV OF WISCONSIN, SCHOOL OF NATURAL RESOURCES, FORESTRY RESEARCH NOTES 175 PAPER NO. 207	-	-	-	-	-	-	B,C
SANDER, IVAN L. 1977 OAKS IN THE NORTH CENTRAL STATES USFS NC-37 GENERAL TECHNICAL REPORT PAPER NO. 187	MULTIPLE	X	X	-	X	X	-
ST. CLAIR, JOHN BRADLEY 1984 ECONOMIC EVALUATION OF LAKE STATES TREE IMPROVEMENT PROGRAMS MASTERS THESIS, UNIV OF WISCONSIN-MADISON PAPER NO. 223	-	-	-	-	-	-	B,C,B/C,IRR
STEWART, RONALD (COMPILER ET AL 1984 EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C

TIMBER MODEL - CITATIONS FOR JACK PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
SUPERIOR NATIONAL FOREST 1987 FOREST REPORT USFS REGION 9 PAPER NO. 685	FOREST REPORT	-	-	-	-	-	B,C
TIMBER, V. R. MORROW, L. D. 1984 PREDICTING FERTILIZER GROWTH RESPONSE & NUTRIENT STATUS OF JACK PINE BY FOLIAR 6TH NORTH AMERICAN FOREST SOILS CONF PROC (JUNE 1983):335-351 PAPER NO. 205	FERTILIZATION	-	-	X	-	-	-
WILDE, S. A. 1933 THE RELATION OF SOILS AND FOREST VEGETATION OF THE LAKE STATES REGION ECOLOGY XIV(2):94-105 PAPER NO. 288	-	-	-	-	-	-	-
WILDE, S. A. 1961 THE SOIL-AMELIORATING EFFECT OF JACK PINE AND RED PINE PLANTATIONS RECENT ADVANCES IN BOTANY, UNIV OF TORONTO PRESS, CANADA PAPER NO. 218	-	-	-	-	-	-	-
WILDE, S. A. 1970 SOILS AND FOREST GROWTH: THEIR RELATIONSHIP IN TERMS OF REGRESSION ANALYSIS BIO SCIENCE (JAN 15, 1970):101-102 PAPER NO. 206	-	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
WILDE, S. A. 1970 GROWTH POTENTIAL OF WISCONSIN NATIVE PINES ON WEED-INVADED SOILS WISCONSIN ACADEMY OF SCIENCES, ARTS & LETTERS 58(1970):197-202 PAPER NO. 216	-	-		-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
ALLEN, H. LEE DUZAN, HOWARD W., JR. 1980 WHAT MEASURE OF STAND DENSITY IS BEST FOR GROWTH PREDICTIONS IN LOBLOLLY PINE USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:175-178 PAPER NO. 46		X	-	-	-	-	-
ALLEN, H. LEE DUZAN, HOWARD W., JR. 1982 NUTRITION MGT LOBLOLLY PINE STANDS: STATUS RPT OF NC STATE FOREST FERT COOP IUFRO SYMPOSIUM ON FOREST SITE & CONTINUOUS PRODUCTIVITY:379-384 PAPER NO. 25	FERTILIZATION	X	X	-	-	-	-
ALLEN, H. LEE BALLARD, RUSS 1983 FOREST FERTILIZATION OF LOBLOLLY PINE N. CAROLINA STATE FOREST FERTILIZATION COOPERATIVE, REPORT # 14 PAPER NO. 4	FERTILIZATION	-	-	X	-	-	-
ALLEN, H. LEE 1985 THE VALUE OF FERTILIZATION AS A SILVICULTURAL TOOL 64TH ANNUAL MEETING OF THE APPALACHIAN SOCIETY OF AMERICAN FORESTERS PAPER NO. 752	FERTILIZATION	-	-	-	-	-	B,C
AMATEIS, RALPH L. BURKHART, HAROLD E. 1980 GROWTH & YIELD PREDICTIONS FOR LOBLOLLY PINE-COOP RESEARCH PROGRAM AT VA TECH USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:169-174 PAPER NO. 69	MULTIPLE	-	-	-	X	X	-

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
AMATEIS, RALPH L. BURKHART, HAROLD E. 1985 SITE INDEX CURVES FOR LOBLOLLY PINE PLANTATIONS ON CUTOVER SITE-PREP LANDS SOUTHERN JOURNAL OF APPLIED FORESTRY 9(3):166-169 PAPER NO. 61	SITE PREPARATION	-	-	-	X	-	-
ANDERSON, HENRY W. ET AL 1986 FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
ARBOUR, STEVEN J. EZELL, ANDREW W. 1980 EFFECT OF MECHANICAL SITE PREP TREAT ON HEIGHT GROWTH LOBLOLLY E TX SANDY SOIL USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:96-99 PAPER NO. 60	SITE PREPARATION		X	-	X	-	-
ASKEW, G. R. WILLIAMS, T. M. 1986 WATER QUALITY CHANGES DUE TO SITE CONVERSION IN COASTAL SOUTH CAROLINA SOUTHERN JOURNAL OF APPLIED FORESTRY 10(1986):134-136 PAPER NO. 528	VEGETATIVE MGMT	-	-	-	-	-	-
BALLARD, R. ET AL 1980 THINNING AND FERTILIZATION OF LOBLOLLY PINE PLANTATIONS USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:100-104 PAPER NO. 19	FERTILIZATION	X	-	X	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
BALLARD, R. 1980 N FERTIL OF ESTABLISHED LOBLOLLY PINE STANDS: FLEXIBLE SILVICULTURAL TECHNIQUE USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:223-229 PAPER NO. 20	FERTILIZATION	X	-	X	-	-	C
BALMER, WILLIAM E. WILLISTON, HAMLIN L. 1975 EARLY CONSIDERATIONS IN PINE MANAGEMENT USFS FOREST MANAGEMENT BULLETIN, SE AREA (OCTOBER) PAPER NO. 10	MULTIPLE	-	X	-	-	-	-
BEASLEY, R. SCOTT GRANILLO, ALFREDO B. 1982 SEDIMENT LOSSES FROM FOREST PRACTICES IN THE GULF COASTAL PLAIN OF ARKANSAS USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:461-467 PAPER NO. 465	LOGGING SYSTEM	-	-	-	-	-	-
BLAIR, ROBERT M. 1971 FORAGE PRODUCTION AFTER HARDWOOD CONTROL IN A SOUTHERN PINE-HARDWOOD STAND FOREST SCIENCE 17(3):279-284 PAPER NO. 310	RANGE REHABILITATION	X	X	-	-	-	-
BRENDEMUEHL, R. H. 1981 OPTIONS FOR MANAGEMENT OF SANDHILL FOREST LAND SOUTHERN JOURNAL OF APPLIED FORESTRY 5(4):216-222 PAPER NO. 254	-	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
BURKHART, HAROLD E. ET AL 1985 YIELD RELATION IN UNTHINNED LOBLOLLY PLANTATIONS ON CUTOVER, SITE-PREP LANDS SOUTHERN JOURNAL OF APPLIED FORESTRY 9(2):81-91 PAPER NO. 39	SITE PREPARATION	-	X	-	-	X	-
CAIN, MICHAEL D. 1984 JAPANESE HONEYSUCKLE/ASSOC GROUND COVER INHIBIT ESTAB & GROWTH PINE SEEDLINGS USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:300-304 PAPER NO. 56	COMPETITOR CONTROL	-	X	-	-	-	-
CAMPBELL, T. E. 1980 SPOT SEEDING IS EFFECTIVE AND INEXPENSIVE FOR REFORESTING SMALL ACREAGES USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:50-53 PAPER NO. 47	-	X	X	-	-	-	-
CARMEAN, WILLARD H. 1975 FOREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	-	-	-	-	-	-	-
CARTER, M. C. ET AL 1975 IMPACT OF CHEMICAL AND MECHANICAL SITE PREPARATION ON WILDLIFE HABITAT 4TH NORTH AMERICAN FOREST SOILS CONF PROC:323-332 PAPER NO. 344	SITE PREPARATION	X	X	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
COILE, T. S. SCHUMACHER, F. X. 1953 RELATION OF SOIL PROPERTIES TO SITE INDEX OF LOBLOLLY & SHORTLEAF IN PIEDMONT JOURNAL OF FORESTRY 51(10):739-744 PAPER NO. 64	-	-	-	-	X	-	-
COMERFORD, N. B. ET AL 1983 ADVANCES IN FOREST FERTILIZATION ON THE SE COASTAL PLAIN USFS PNW-163 GENERAL TECHNICAL REPORT (DEC 1983):370-378 PAPER NO. 160	FERTILIZATION	-	X	X	-	-	-
CRUTCHFIELD, DOUGLAS M. UNKWN FERTILIZATION - EFFECT ON PRODUCTIVITY! WESTVACO CORP, GEORGETOWN, SOUTH CAROLINA PAPER NO. 26	FERTILIZATION	X	X	X	-		B,C
DERR, H. J. MANN, W. F., JR. UNKWN SITE PREPARATION IMPROVES GROWTH OF PLANTED PINES USFS SO RESEARCH NOTE PAPER NO. 166	SITE PREPARATION	-	X	-	-	-	-
DEWIT, JAMES N. TERRY, THOMAS A. 1982 SITE PREP EFFECTS EARLY LOBLOLLY GRWTH/HRDWD COMPETITION & SOIL PHYSICAL PROP USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:40-47 PAPER NO. 62	SITE PREPARATION	-	-	-	X	-	-

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
DICKERSON, B. P. 1976 SOIL COMPACTION AFTER TREE-LENGTH SKIDDING IN NORTHERN MISSISSIPPI SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 40(6):965-966 PAPER NO. 268	SKID TRAILS	-	-	-	-	-	-
DISSMEYER, GEORGE E. 1985 ECONOMIC IMPACTS OF EROSION CONTROL IN FORESTS SOUTHERN FORESTRY SYMPOSIUM, ATLANTA, GA, NOV 19-21, 1985 PAPER NO. 293	MULTIPLE	X	X	X	X	-	B,C,IRR
DISSMEYER, GEORGE E. POSTER, BENNETT 1987 SOME ECONOMIC BENEFITS OF PROTECTING WATER QUALITY (IN A PROCEEDINGS) USFS SO-65 GENERAL TECHNICAL REPORT PAPER NO. 289	MULTIPLE	-	X	-	-	-	B,C,B/C,IRR
DOUGLASS, JAMES E. ET AL 1982 STORMFLOW CHANGES AFTER PRESCRIBED BURNING & CLEARCUTTING PINE STANDS IN SC USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:454-460 PAPER NO. 508	LOGGING SYSTEM	-	-	-	-	-	-
DUZAN, HOWARD W., JR. ALLEN, H. LEE 1980 ESTIMATING FERTILIZER RESPONSE IN SITE-PREP PINE PLANTAT USING B.A./SITE INDEX USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:219-222 PAPER NO. 68	FERTILIZATION	-	-	-	-	X	-

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
EDWARDS, M. BOYD, JR. 1986 3-YR PERFORM PLANTED LOBLOLLY SEEDL ON LOW PIEDMONT SITE AFTER 6 SITE PREPS USFS SE-337 RESEARCH NOTE PAPER NO. 57	SITE PREPARATION	-	X	-	-	-	-
FEDKIW, JOHN ET AL 1983 CONVERSION OP SOUTHERN CROPLAND TO SOUTHERN PINE TREE PLANTINGS: CONVERSION USDA OFFICE OF BUDGET AND PROGRAM ANALYSIS PAPER NO. 740	TYPE CONVERSION	-	-	-	-	-	B,C,IRR
FISHER, R. F. 1980 SOILS INTERPRETATIONS FOR SILVICULTURE IN THE SOUTHEASTERN COASTAL PLAIN USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:323-330 PAPER NO. 175	MULTIPLE	-	X	X	-	-	-
FISHER, RICHARD P. 1981 A PRELIMINARY GUIDE TO MAINTAINING & IMPROVING FOREST SITE PRODUCTIVITY IN SE A REPORT FOR USFS REGION 8 PAPER NO. 243	MULTIPLE	-	-	-	-	-	-
FISHER, RICHARD F. 1983 PREDICTING TREE AND STAND RESPONSE TO CULTURAL PRACTICES 6TH NORTH AMERICAN POREST SOILS CONF:53-65 PAPER NO. 32	MULTIPLE	-	X	X	-	-	-

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION			PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
FLICK, WARREN A.	ET AL	1979							
LOBLOLLY PINE PLANTATIONS IN SOUTHERN HIGHLANDS: SOME FINANCIAL GUIDES									
SOUTHERN JOURNAL OF APPLIED FORESTRY (3):107-113									
PAPER NO. 221			-	-	-	-	-	-	B,C,B/C,IRR
FOX, T. R.	ET AL	1984							
ADAPTATION OF FOREST NUTRIENT CYCLING TREND EVALUATOR (FORCYTE)-LOBLOLLY PINE									
USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:203-211									
PAPER NO. 24			MULTIPLE	X	X		X	-	-
FOX, T. R.	ET AL	1986							
EFFECTS OF SITE PREPARATION ON NITROGEN DYNAMICS IN THE SOUTHERN PIEDMONT									
FOREST ECOLOGY AND MGMT 15:241-256									
PAPER NO. 33			SITE PREPARATION	-	-	-	-	-	-
GAISER, RICHARD N.		1950							
RELATION BETWEEN SOIL CHAR & SITE INDEX OF LOBLOLLY IN COASTAL PLAIN REGION									
JOURNAL OF FORESTRY 48(4):271-275									
PAPER NO. 63			-	-	-	-	X	-	-
GENT, J. A.	ET AL	1984							
IMPACT OF HARVEST & SITE PREP ON PHYSICAL PROPERTIES OF PIEDMONT FOREST SOILS									
SOIL SCIENCE SOCIETY OF AMERICAN JOURNAL 48:173-177									
PAPER NO. 41			MULTIPLE	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
GENT, J. A., JR. BALLARD, R. 1985 IMPACT OF INTENSE FOR MGT PRACT ON BULK DENSITY COASTAL PLAIN/PIEDMONT SOILS SOUTHERN JOURNAL OF APPLIED FORESTRY 9(1):44-48 PAPER NO. 23	MULTIPLE	-	-	-	-	-	-
GLOVER, GLENN R. ET AL 1981 FAYETTE SITE PREPARATION STUDY--22 YEAR RESULTS (JUNE 1981) AUBURN UNIV, DEPT OF FORESTRY, SILVIC HERBICIDE COOP NOTE #1 PAPER NO. 42	SITE PREPARATION	-	-	-	-	-	C,IRR
GOLDEN, MICHAEL S. ET AL 1981 PREDICTING SITE INDEX FOR OLD-FIELD LOBLOLLY PINE PLANTATIONS SOUTHERN JOURNAL OF APPLIED FORESTRY 5(3):109-114 PAPER NO. 66		-	-	-	X	-	-
GRANO, CHARLES X. 1970 ERADICATING UNDERSTORY HARDWOODS BY REPEATED PRESCRIBED BURNING USFS SO-56 RESEARCH PAPER PAPER NO. 29	COMPETITOR CONTROL	-	-	-	-	-	-
GRANO, CHARLES X. 1970 SMALL HARDWOODS REDUCE GROWTH OF PINE OVERSTORY USFS SO-55 RESEARCH PAPER PAPER NO. 30	COMPETITOR CONTROL	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
GULDIN, RICHARD W. 1982 HANDPLANTING COSTS ARE INFLUENCED BY PLANTING SITE CHARACTERISTICS USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:30-33 PAPER NO. 275	MULTIPLE	-	X	-	-	-	C
HAFLEY, W. L. SMITH, W. D. 1982 A NEW YIELD PREDICTION MODEL FOR UNTHINNED LOBLOLLY PINE IN PLANTATIONS TECHNICAL REPORT NO. 1, SOUTHERN FOREST RESEARCH CENTER, N.C. STATE UNIVERSITY PAPER NO. 755	GENERAL	-	-	-	-	X	-
HALLS, LOWELL K. SCHUSTER, JOSEPH L. 1965 TREE-HERBAGE RELATIONS IN PINE-HARDWOOD FORESTS OF TEXAS JOURNAL OF FORESTRY 63(4):282-283 PAPER NO. 365	-	-	-	X	-	-	-
HARMS, WILLIAM R. 1980 A COMPETITION FUNCTION FOR TREE AND STAND GROWTH MODELS USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:179-183 PAPER NO. 65	-		X	-	X	-	-
HART, S. C. ET AL 1986 PREDICTING LOBLOLLY PINE CURRENT GROWTH & GROWTH RESPONSE TO FERTILIZATION SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 50(1):230-233 PAPER NO. 35	FERTILIZATION	X	-	X	-	-	-

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
HATCHELL, G. E. ET AL 1970 SOIL DISTURBANCES IN LOGGING, EFFECTS ON SOIL CHARACTER & GROWTH OF LOBLOLLY JOURNAL OF FORESTRY 68(12):772-775 PAPER NO. 16	LOGGING SYSTEM	X	X	-	-	-	-
HATCHELL, GLYNDON E. 1981 SITE PREP & FERTILIZER INCREASE PINE GROWTH ON SOILS COMPACTED IN LOGGING SOUTHERN JOURNAL OF APPLIED FORESTRY 5(2):79-83 PAPER NO. 31	MULTIPLE	-	X	-	-	-	-
HAYWOOD, J. D. ET AL 1981 INTENSIVE SITE PREPARATION AFFECTS LOBLOLLY PINE GROWTH ON UPLAND SITES AMER SOC AGR ENGINEERS SYMP ON ENGINEERING SYSTEM FOREST REGENERATION (MARCH) PAPER NO. 14	SITE PREPARATION	-	X	-	-	-	-
HAYWOOD, J. D. MELDER, T. W. 1982 HOW SITE TREATMENTS AFFECT PINE AND COMPETING PLANT COVER SOUTHERN WEED SCIENCE SOCIETY PROC (JANUARY 1982):224-230 PAPER NO. 37	SITE PREPARATION	-	X	-	-	-	-
HAYWOOD, JAMES D. 1980 CONTROL OF DOGFENNEL DOES NOT INCREASE LOBLOLLY PINE YIELDS USFS SO-258 RESEARCH NOTE PAPER NO. 9	COMPETITOR CONTROL	-	X	-	-	-	-

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
HAYWOOD, JAMES D. 1980 PREPARING PINE PLANTING SITES WITH PICLORAM PELLETS SOUTHERN WEED SCIENCE SOCIETY PROC 33:115-118 PAPER NO. 12	COMPETITOR CONTROL	-	X	-	-	-	-
HU, SHIH-CHANG DITTHAVONG, VORADETH 1980 THE EFFECTS OF SITE PREPARATION ON GROWTH OF LOBLOLLY PINE IN SE LOUISIANA USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:92-95 PAPER NO. 18	SITE PREPARATION	-	X	-	-	-	-
HURST, GEORGE A. WARREN, RANDY C. 1982 IMPACTS OF SILVIC PRACTICES IN LOBLOLLY PLANTATIONS ON WHITE-TAILED DEER HAB USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURE RESEARCH CONF PROC:484-487 PAPER NO. 347	MULTIPLE	-	-	-		-	-
JORGENSEN, JACQUES WELLS, CAROL 1986 FORESTERS' PRIMER IN NUTRIENT CYCLING USFS SE-37 GENERAL TECHNICAL REPORT PAPER NO. 3	MULTIPLE	-	-	-	X	-	-
JORGENSEN, JACQUES R. 1980 USE OF LEGUMES IN SOUTHEASTERN FORESTRY RESEARCH USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:205-211 PAPER NO. 44	FERTILIZATION	-	-	-	-	-	-

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CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
KOPACK, ROB 1985 SURVIVAL & GROWTH OF LOBLOLLY & SHORTLEAF PINE SEEDLINGS ON CHOCTAW RANGER DIS OUACHITA NATIONAL FOREST, REGION 8 PAPER NO. 690	-	-	X	-	-	-	-
KREH, R. E. ET AL 1984 SOIL COMPACT FROM TRACKED/RUBBER-TIRED TRACTORS, INFLU SEEDLING SURV/GROWTH USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:327-330 PAPER NO. 55	MULTIPLE	-	X	-	-	-	-
LANGDON, O. GORDON MCKEE, WILLIAM H., JR. 1980 CAN FERTILIZATION OF LOBLOLLY PINE ON WET SITES REDUCE THE NEED FOR DRAINAGE USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:212-218 PAPER NO. 21	FERTILIZATION	-	-	X	-	-	B
LANTAGNE, D. O. BURGER, J. A. 1982 1ST YR SURVIVAL/GROWTH LOBLOLLY AS AFFECTED BY SITE PREP ON SC & GA PIEDMONT USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:5-10 PAPER NO. 51	SITE PREPARATION	-	X	-	-	-	-
LOCKABY, B. GRAEME VIDRINE, CLYDE G. 1984 EFFECT OF LOG EQUIP TRAFFIC ON SOIL DENSITY, GROWTH/SURVIVAL OF YOUNG LOBLOLLY SOUTHERN JOURNAL OF APPLIED FORESTRY 8(?):109-112 PAPER NO. 59	LOGGING SYSTEM	-	X	-	-	-	-

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CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
MCKEE, W. H., JR ET AL 1985 MANAGING SITE DAMAGE PROM LOGGING USFS SE-32 GENERAL TECHNICAL REPORT PAPER NO. 1	MULTIPLE	-	X	-	X	-	-
MCKEE, W. H., JR. LAW, D. L. 1985 RESPONSE TO PERTILIZATION ON THE PRANCIS MARION & SUMTER NATIONAL FORESTS USFS REPORT FS-SE-1103-157(2) PAPER NO. 73	FERTILIZATION	-	-	X	-	-	B,C,B/C,IRR
MCKEE, W. H., JR. LAW, D. L. 1985 RESPONSE TO PERTILIZATION ON THE PRANCIS MARION AND SUMTER NATIONAL FORESTS USFS SOUTHEAST POREST EXPERIMENT STA AND FRANCIS MARION & SUMTER NAT'L FOREST PAPER NO. 691	FOREST REPORT	X	-	X	-	-	B,C,B/C,IRR
MCKEE, WILLIAM H. 1982 CHANGES IN SOIL PERTILITY FOLLOWING PRESCRIBED BURNING COASTAL PLAIN PINE SITE USFS SE-234 RESEARCH PAPER PAPER NO. 168	SITE PREPARATION	-	-	-	-	-	-
MCLEMORE, B. F. 1980 MINIMUM STOCK LEVEL REQ POR SUCCESS MGT OP UNEVEN-AGED LOBLOLLY-SHORTLEAP PINE USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:292-293 PAPER NO. 45	-	X	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
MILLER, JAMES H. 1980 COMPETITION AFTER WINDROWING OR SINGLE-ROLLER CHOPPING SITE PREP IN S PIEDMONT SOUTHERN WEED SCIENCE SOCIETY PROC 33:139-145 PAPER NO. 7	SITE PREPARATION	-	-	-	-	-	-
MOEHRING, DAVID M. RAWLS, IKE W. 1970 DETRIMENTAL EFFECTS OF WET WEATHER LOGGING JOURNAL OF FORESTRY 68(3):166-167 PAPER NO. 15	LOGGING SYSTEM	-	-	X	-	-	-
MURPHY, PAUL A. 1980 GROWTH & YIELD OF UNEVEN-AGED LOBLOLLY-SHORTLEAF PINE STANDS--PROGRESS REPORT USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:305-310 PAPER NO. 70	-	-	-	-	-	X	-
NC STATE FOREST FERT COOP - - NORTH CAROLINA STATE FOREST FERTILIZATION COOPERATIVE THIRTEENTH ANNUAL REPORT SCHOOL OF FOREST RESOURCES, N.C. STATE UNIV, RALEIGH PAPER NO. 757	FERTILIZATION	-	X	X	-	-	-
NC STATE FOREST FERT COOP - 1983 LOBLOLLY PINE FERTILIZER PLANNING PROGRAM: DESCRIPTION AND USER GUIDE NCSFFC RESEARCH NOTE NO. 3, SCHOOL OF FOREST RESOURCES, N.C. STATE UNIVERSITY PAPER NO. 756	FERTILIZATION	-	X	X	-	-	B,C

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CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
NC STATE FOREST FERT COOP 1984 PHOSPHORUS FERTILIZATION IN YOUNG LOBLOLLY PINE STANDS NCSFFC REPORT NO. 17, SCHOOL OF FOREST RESOURCES, N.C. STATE UNIVERSITY PAPER NO. 754	FERTILIZATION	-	X	X	-	-	B,C
NEARY, D. G. ET AL 1983 SITE PREPARATION AND NUTRIENT MANAGEMENT IN SOUTHERN PINE FORESTS 6TH NORTH AMERICAN FOREST SOILS CONF:121-144 PAPER NO. 13	MULTIPLE	-	X	-	-	-	-
NELSON, LARRY R. ET AL UNKWN IMPACTS OF HERBACEOUS WEEDS IN YOUNG LOBLOLLY PINE PLANTATIONS SOUTHERN JOURNAL OF APPLIED FORESTRY:153-158 PAPER NO. 8	COMPETITOR CONTROL	-	X	-	-	-	-
PEARSON, HENRY A. 1980 FOREST AND RANGE INTERACTIONS USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:339-342 PAPER NO. 360	-	X	X	-	-	-	B,C,IRR
PEARSON, HENRY A. 1983 FOREST GRAZING IN THE SOUTHERN UNITED STATES OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:247-260 PAPER NO. 358	VEGETATIVE MGMT	-	X	-	-	-	B

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
PEHL, C. E. BAILEY, R. L. 1983 PERFORM TO AGE 10 LOBLOLLY PINE PLANT ON INTENSE PREP SITE IN GEORGIA PIEDMONT FOREST SCIENCE 29(1):96-102 PAPER NO. 58	SITE PREPARATION	-	X	-	-	-	-
PEHL, CHARLES E. 1984 SITE PREPARATION INFLUENCES ON YOUNG LOBLOLLY PINE PLANTATIONS IN EAST TEXAS SOUTHERN JOURNAL OP APPLIED FORESTRY 8(?):140-145 PAPER NO. 36	SITE PREPARATION	-	-	-	-	-	-
PRITCHETT, W. L. SMITH, W. H. 1973 POREST FERTILIZATION IN THE U.S. SOUTHEAST 4TH NORTH AMERICAN POREST SOILS CONP PROC:467-476 PAPER NO. 27	FERTILIZATION	-	X	-	-	-	-
SARIGUMBA, TERRY I. UNKWN FERTILIZATION OP YOUNG PLANTATIONS IN THE SOUTHEAST COPIES AVAILABLE UPON REQUEST PAPER NO. 169	FERTILIZATION	-	X	X	-	-	-
SAUCIER, JOSEPH R. ET AL 1981 GREEN WEIGHT, VOLUME, BOARD-POOT AND CORD TABLES FOR MAJOR SOUTHERN PINES SPP GEORGIA FORESTRY COMMISSION, GEORGIA PORES1 RESEARCH PAPER 19 PAPER NO. 235		-	-	-	-	X	-

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CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
SCHUMACHER, F. X. COILE, T. S. 1960 GROWTH AND YIELDS OF NATURAL STANDS OF THE SOUTHERN PINES PUBLISHED BY T. S. COILE, INC., DURHAM, N.C. PAPER NO. 283	-	X	-	-	-	X	-
SHOULDERS, EUGENE TERRY, T. A. 1978 DEALING WITH SITE DISTURBANCES FROM HARVESTING & SITE PREP IN LOW COAST PLAIN SYMPOSIUM ON PRINCIPLES OF MAINT PRODUCTIVITY ON PREP SITE PROC, MS STATE UNIV PAPER NO. 269	MULTIPLE	-	-	-	-	-	-
SIMMONS, GERRY L. EZELL, ANDREW W. 1982 ROOT DEVELOPMENT OF LOBLOLLY PINE SEEDLINGS IN COMPACTED SOILS USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:26-29 PAPER NO. 53	SITE PREPARATION	-	X	-	-	-	-
SMALLEY, GLENDON W. BAILEY, ROBERT L. 1974 YIELD TABLES AND STAND STRUCTURE FOR LOBLOLLY PINE PLANTATIONS IN TN, AL, GA USFS SO-96 RESEARCH PAPER PAPER NO. 71	-	-	X	-	X	X	-
STAFFORD, C. W. ET AL 1984 AN EVALUATION OF SITE PREP METHODS FOR LOBLOLLY PINE REGENERATION ON PIEDMONT USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:57-60 PAPER NO. 50	SITE PREPARATION	-	X	-	-	-	-

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CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
STEWART, RONALD (COMPILER ET AL 1984 EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C
STRANSKY, J. J. 1981 SITE PREPARATION EFFECTS ON SOIL BULK DENSITY AND PINE SEEDLING GROWTH SOUTHERN JOURNAL OF APPLIED FORESTRY 5(4):176-180 PAPER NO. 34	SITE PREPARATION	-	X	-	-	-	-
STRANSKY, J. J. ET AL 1985 SOIL PROPERTIES & PINE GROWTH AFFECTED BY SITE PREPARATION AFTER CLEARCUTTING SOUTHERN JOURNAL OF APPLIED FORESTRY 9(1):40-44 PAPER NO. 48	SITE PREPARATION	-	X	-	-	-	-
STRANSKY, JOHN J. HALLS, LOWELL K. 1980 FORAGE AND PINE GROWTH WITH CLEARCUTTING AND SITE PREPARATION USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:343-348 PAPER NO. 353	VEGETATIVE MGMT	X	X	X	-	-	-
SULLIVAN, ALFRED D. WILLISTON, HAMLIN L. 1977 GROWTH & YIELD OF THINNED LOBLOLLY PINE PLANTATIONS IN LOESSIAL SOIL AREAS MISSISSIPPI AGRICULTURAL FOREST EXPERIMENT STATION TECHNICAL BULLETIN (MAY) PAPER NO. 72		-	-	-	X	X	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
SWITZER, G. L. ET AL 1978 CLEARCUTTING VS ALTERNATIVE TIMBER HARVESTING - STAND REGENERATION SYSTEMS 5TH NORTH AMERICAN FOREST SOILS CONF PROC:477-515 PAPER NO. 287	MULTIPLE	-	-	-	-	-	
TERRY, T. A. HUGHES, J. H. 1973 EFFECTS OF INTENSE MGT ON PLANTED LOBLOLLY PINE GROWTH ON POORLY DRAINED SOILS 4TH NORTH AMERICAN FOREST SOILS CONF PROC:351-377 PAPER NO. 28	MULTIPLE	-	X	-	X	-	-
TEW, D. THOMPSON ET AL 1986 EST NUTRIENT REMOVAL, DISPLACE, LOSS FROM HARVEST/SITE PREP OF LOBLOLLY IN NC FOREST ECOLOGY AND MANAGEMENT 15:257-267 PAPER NO. 17	MULTIPLE	-	-	-	-	-	-
THILL, RONALD E. WOLTERS, GALE L. 1979 CATTLE PRODUCTION ON A SOUTHERN PINE-HARDWOOD FOREST RANGELANDS 1(2):60-61 PAPER NO. 359	VEGETATIVE MGMT	-	-	-	-	-	B,C
TIARKS, ALLAN E. HAYWOOD, JAMES D. 1986 PINUS TAEDA RESPONSE TO FERTIL, HERBACEOUS PLANT CONTROL & WOODY PLANT CONTROL FOREST ECOLOGY AND MGMT 14(2):103-112 PAPER NO. 22	MULTIPLE	-	X	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
TIPPIN, TOM (EDITOR) 1978 PROCEEDINGS: SYMPOSIUM ON PRINCIPLES OF MAINT PRODUCTIVITY ON PREPARED SITES USFS SE AREA STATE & PRIVATE FORESTRY, ATLANTA, GEORGIA PAPER NO. 234	MULTIPLE	-	-	-	-	X	B,C
TORBERT, J. L. ET AL 1984 EFFECT OVERBURDEN TYPE & ORGANIC AMEND ON GROWTH PINES ON RECLAIM SURFACE MINE USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:369-374 PAPER NO. 49	-	-	X	-	-	-	-
TUTTLE, C. L. ET AL 1984 SITE PREP EFFECT ON SELECTED SOIL PROP & EARLY LOBLOLLY PINE SEEDLING GROWTH USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:45-52 PAPER NO. 52	SITE PREPARATION	-	X	-	-	-	-
TUTTLE, CHARLES L. ET AL 1982 EFFECT OF SURFACE SOIL REMOVAL ON SELECTED SOIL PROP & LOBLOLLY PINE SEEDLINGS USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:18-22 PAPER NO. 54	MULTIPLE	-	X	-	-	-	-
URSIC, S. J. 1984 HYDROLOGIC EFFECTS OF COMPLETE & CONVENTIONAL HARVEST OF LOBLOLLY PINE BIOMASS USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:565-572 PAPER NO. 467	LOGGING SYSTEM	-	-	X	-	-	-

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
VITOUSEK, PETER M. MATSON, PAMELA A. 1985 INTENSIVE HARVEST & SITE PREP DECREASE SOIL NITROGEN AVAIL IN YOUNG PLANTATION SOUTHERN JOURNAL OF APPLIED FORESTRY 9(2):120-125 PAPER NO. 40	MULTIPLE	-	X	-	-	-	-
WALKER, LAURENCE C. PERKINS, HENRY F. 1958 FOREST SOILS AND SILVICULTURE IN GEORGIA SCHOOL OF FORESTRY & COLLEGE OF AGRIC, UNIV OF GEORGIA-ATHENS, REPORT 4 PAPER NO. 233	MULTIPLE	-	-	-	X	-	-
WEBB, ROGER S. ALEXANDER, SAMUEL A. 1982 SUBSOILING AND REDUCED RADIAL GROWTH-SEED ORCHARD LOBLOLLY ESTAB ON SANDY SOIL SOUTHERN JOURNAL OF APPLIED FORESTRY 6(?):163-167 PAPER NO. 38	SITE PREPARATION	-	X	-	-	-	-
WELLS, C. G. JORGENSEN, J. R. 1973 NUTRIENT CYCLING IN LOBLOLLY PINE PLANTATIONS 4TH NORTH AMERICAN FOREST SOILS CONF PROC:137-158 PAPER NO. 67	-	-	-	-	-	-	-
WELLS, CAROL MORRIS, LARRY 1983 MAINTENANCE AND IMPROVEMENT OF SOIL PRODUCTIVITY N. CAROLINA STATE FOREST FERTILIZATION COOPERATIVE, REPORT # 14 PAPER NO. 5	MULTIPLE	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
WELLS, CAROL ALLEN, LEE 1985 WHEN AND WHERE TO APPLY PERTILIZER USFS SE-36 GENERAL TECHNICAL REPORT PAPER NO. 2	FERTILIZATION	X	-	-	-	-	B,C,
WELLS, CAROL G. ET AL 1976 5-YR VOL INCREMENT PROM N PERTIL IN THINNED PLANTATIONS OP POLE-SIZE LOBLOLLY FOREST SCIENCE 22(1):85-90 PAPER NO. 6	FERTILIZATION	-	-	X	-	-	
WHIPPLE, SHERMAN D. WHITE, EDWIN H. 1965 RESPONSE OP PLANTED LOBLOLLY PINE FOLLOWING VARIOUS CONVERSION METHODS AUBURN UNIV, AGRIC EXPERIMENT STATION, BULLETIN 362 (NOV) PAPER NO. 43	COMPETITOR CONTROL	X	X	-	X	-	C
WILLIAMS, THOMAS M. ASKEW, GEORGE R. 1984 WATER QUALITY CHANGES ASSOCIATED WITH FOREST DRAINAGE & PINE PLANTATION ESTAB USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONP PROC:536-549 PAPER NO. 466	VEGETATIVE MGMT	-	-	-	-	-	-
WILLISTON, HAMLIN L. 1977 RELEASE CUTTING IN SOUTHERN FORESTS: ECONOMICAL AND EPFECTIVE STAND CONVERSION USFS FOREST MGMT BULLETIN (NOV 1977) PAPER NO. 104	COMPETITOR CONTROL	-	X	-	-	-	-

TIMBER MODEL - CITATIONS FOR LOBLOLLY PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
WILLISTON, HAMLIN L. 1978 GROWTH OF UNDERSTOCKED SOUTHERN PINE STANDS USFS FOREST MANAGEMENT BULLETIN, SE AREA (FEBRUARY) PAPER NO. 11	COMPETITOR CONTROL	X	-	-	-	X	-
WOOD, GENE W. 1986 INFLUENCES OF FOREST FERTILIZATION ON SOUTH CAROLINA DEER FORAGE QUALITY SOUTHERN JOURNAL OF APPLIED FORESTRY 10:203-205 PAPER NO. 345	FERTILIZATION	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR LODGEPOLE PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
ALEXANDER, ROBERT R. 1966 SITE INDEXES LODGEPOLE PINE WITH CORRECTIONS FOR STAND DENSITY USFS RM-24 RESEARCH PAPER PAPER NO. 153	-	-	-	-	X	-	-
ALEXANDER, ROBERT R. 1986 SILVIC SYSTEMS/CUTTING METHODS OF OLD-GROWTH LODGEPOLE FORESTS CTR ROCKY MTNS USFS RM-127 GENERAL TECHNICAL REPORT PAPER NO. 149	MULTIPLE	-	X	X	-	-	-
ANDERSON, HENRY W. ET AL 1986 FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
BRENDEMUEHL, R. H. 1981 OPTIONS FOR MANAGEMENT OF SANDHILL FOREST LAND SOUTHERN JOURNAL OF APPLIED FORESTRY 5(4):216-222 PAPER NO. 254	-	-	-	-	-	-	-
CARMEAN, WILLARD H. 1975 FOREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	-	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR LODGEPOLE PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
CLAYTON, JAMES L. ET AL UNKWN SOIL DISTURBANCE - PRODUCTIVITY RELATIONS IN CENTRAL IDAHO CLEARCUTS USFS REGION 4 PAPER NO. 151	- MULTIPLE	-	X	-	-	-	-
COCHRAN, P. H. 1975 RESPONSE OF POLE-SIZE LODGEPOLE PINE TO FERTILIZATION USFS PNW-247 RESEARCH NOTE PAPER NO. 154	FERTILIZATION	-	X	X	-	-	-
DEBYLE, NORBERT V. 1979 HARVEST & SITE TREATMENT INFLUENCES ON NUTRIENT STATUS LODGEPOLE PINE FORESTS ENVIRON CONSEQUENCE TIMBER HARVEST ROCKY MTN CONIFEROUS FOR SYMP PROC:137-155 PAPER NO. 147	MULTIPLE		X	-	-	-	-
EIS, S. ET AL 1982 GROWTH LODGEPOLE PINE & WHITE SPRUCE IN CENTRAL INTERIOR OF BRITISH COLUMBIA CANADIAN JOURNAL OF FOREST RESEARCH 12(1982):567-575 PAPER NO. 152	-	X	-	-	X	-	-
FROEHLICH, H. A. ET AL 1986 GROWTH OF YOUNG PINUS PONDEROSA & CONTORTA ON COMPACTED SOIL IN CENTRAL WA FOREST ECOLOGY AND MGMT 15(1986):285-294 PAPER NO. 89	SKID TRAILS	-	X	-	-	-	-

TIMBER MODEL - CITATIONS FOR LODGEPOLE PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
GARY, HOWARD L. 1980 PATCH CLEARCUTS TO MANAGE SNOW IN LODGEPOLE PINE AM SOC CIVIL ENGINEERS, WATERSHED MANAGEMENT SYMPOSIUM PROC 1:335-346 PAPER NO. 494	LOGGING SYSTEM	-	-	-	-	-	-
HOLMES, JOHN R. B. TACKLE, DAVID 1962 HEIGHT GROWTH OF LODGEPOLE PINE IN MONTANA RELATED TO SOIL AND STAND FACTORS MONTANA FOREST & CONSERV EXP STA, SCHOOL OF FORESTRY, BULLETIN 21 (MAY 1962) PAPER NO. 155		X	-	-	-	-	-
KAUFMANN, MERRILL R. 1983 CANOPY MODEL (RM-CWU)-DETERM TRANSPIR SUBALPINE FOREST II. CONSUMP WATER USE CANADIAN JOURNAL OF FOREST RESEARCH 14:227-232 PAPER NO. 492	LOGGING SYSTEM	-	-	-	-	-	-
KAUFMANN, MERRILL R. 1984 CANOPY MODEL (RM-CWU) FOR DETERM TRANSPIRATION SUBALPINE FOREST I. MODEL LEVEL CANADIAN JOURNAL OF FOREST RESEARCH 14:218-226 PAPER NO. 491	LOGGING SYSTEM	-	-	-	-	-	-
KAUFMANN, MERRILL R. 1985 MODELLING TRANSPIRATION OF SUBALPINE TREES IN THE CENTRAL ROCKY MOUNTAINS SYMP BY COMM ON WATERSHED MGMT/IRRIG & DRAIN, AM SOC CIVIL ENGINEERS 1:61-68 PAPER NO. 489	LOGGING SYSTEM	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR LODGEPOLE PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
KAUFMANN, MERRILL R. 1985							
NEW SILVICULTURAL OPTIONS FOR TIMBER AND WATER YIELD IN THE ROCKY MOUNTAINS							
SOCIETY OF AMERICAN FORESTERS NATIONAL CONVENTION PROC:237-242							
PAPER NO. 490	LOGGING SYSTEM	-	-	-	-	-	-
LEAF, CHARLES F. 1975							
WATERSHED MGMT IN CENTRAL & SOUTHERN ROCKY MTNS: SUMMARY OF STATUS OF KNOWLEDG							
USFS RM-142 RESEARCH PAPER							
PAPER NO. 723	GENERAL WATERSHED MGMT	-	-	-	-	-	-
MCKAY, NEIL 1985							
A STOCKABILITY EQUATION FOR FOREST LAND IN SISKIYOU COUNTY, CALIFORNIA							
USFS PNW-435 RESEARCH NOTE							
PAPER NO. 274	-	X	-	-	-	-	-
MCLEAN, ALASTAIR 1983							
PRODUCING FORAGE FOR LIVESTOCK ON FOREST RANGES							
OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:175-183							
PAPER NO. 382	VEGETATIVE MGMT	X	X	-	-	-	-
MOGREN, E. W. DOLPH, K. P. 1972							
PREDICTION OF SITE INDEX OF LODGEPOLE PINE FROM SELECTED ENVIRONMENTAL FACTORS							
FOREST SCIENCE 18(4):314-316							
PAPER NO. 156	-	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR LODGEPOLE PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
MURRAY, MAYO (ED) 1983 LODGEPOLE PINE: REGENERATION AND MANAGEMENT USFS PNW-157 GENERAL TECHNICAL REPORT PAPER NO. 150	MULTIPLE	X	-	-	X	-	-
PACKER, PAUL E. WILLIAMS, BRYAN D. 1979 LOGGING RESIDUE DISPOSAL EFFECTS ON SURFACE HYDRO/SOIL STABILITY OF LODGEPOLE ENVIRON CONSEQUENCE TIMBER HARVEST ROCKY MTN CONIFEROUS FOR SYMP PROC:111-122 PAPER NO. 148	LOGGING SYSTEM	-	-	-	-	-	-
SCHMIDT, WYMAN C. LOTAN, JAMES E. 1979 ESTABLISHMENT & INITIAL DEVELOPMENT OF LODGEPOLE PINE RESPONSE TO RESIDUE MGMT ENVIRON CONSEQUENCE TIMBER HARVEST ROCKY MTN CONIFEROUS FOR SYMP PROC:271-286 PAPER NO. 146	MULTIPLE	X	X	-	-	-	-
SMITH, R. B. WASS, E. F. 1980 TREE GROWTH ON SKIDROADS ON STEEP SLOPES LOGGED AFTER WILDFIRES-BRIT.COLUMBIA CANADIAN FORESTRY SERVICE, PACIFIC FOREST RESEARCH CENTRE (NOV. 1980) PAPER NO. 116	SKID TRAILS	X	-	-	-	-	-
STEWART, RONALD (COMPILER ET AL 1984 EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C

TIMBER MODEL - CITATIONS FOR LODGEPOLE PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
TAPPEINER II, J. C. ET AL 1986 PART 2, PACIFIC COAST, THE NEXT 30 YEARS - SILVICULTURE - THE PAST 30 YEARS JOURNAL OF FORESTRY 84(5):37-46 PAPER NO. 248	MULTIPLE	-	-	-	-	-	-
TROENDLE, C. A. MEIMAN, J. R. 1984 OPTIONS FOR HARVESTING TIMBER TO CONTROL SNOWPACK ACCUMULATION 52ND ANNUAL MEETING, WESTERN SNOW CONF PROC 1:86-97 - PAPER NO. 493	LOGGING SYSTEM	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
ANDERSON, HENRY W. ET AL 1986 FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
BALMER, WILLIAM E. WILLISTON, HAMLIN L. 1975 EARLY CONSIDERATIONS IN PINE MANAGEMENT USFS FOREST MANAGEMENT BULLETIN, SE AREA (OCTOBER) PAPER NO. 10	MULTIPLE	-	X	-	-	-	-
BOYER, WILLIAM D. 1980 SITE/STAND FACTORS AFFECTING HEIGHT GROWTH CURVES OF LONGLEAF PINE PLANTATIONS USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:184-187 PAPER NO. 107	-	-	-	-	X	-	-
BOYER, WILLIAM D. 1980 INTERIM SITE-INDEX CURVES FOR LONGLEAF PINE PLANTATIONS USFS SO-261 RESEARCH NOTE PAPER NO. 108	-	-	-	-	X	-	-
BOYER, WILLIAM D. 1982 GROWTH YG LONGLEAF OVER 7 YRS AS AFFECT BY BIENN BURN SUPPL BY CHEM/MECH TREAT USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC PAPER NO. 105	SITE PREPARATION	-	X	-	-	-	-

TIMBER MODEL - CITATIONS FOR LONGLEAF PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
BRENDEMUEHL, R. H. 1981 OPTIONS FOR MANAGEMENT OF SANDHILL FOREST LAND SOUTHERN JOURNAL OF APPLIED FORESTRY 5(4):216-222 PAPER NO. 254	-	-	-	-	-	-	-
CARMEAN, WILLARD H. 1975 FOREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232	-	-	-	-	-	-	-
FARRAR, ROBERT M., JR. 1981 A SITE-INDEX FUNCTION FOR NATURALLY REGENERATED LONGLEAF PINE EAST GULF AREA SOUTHERN JOURNAL OF APPLIED FORESTRY 5(3):150-153 PAPER NO. 109	-	-	-	-	X	-	-
FARRAR, ROBERT M., JR. WHITE, JOHN B. 1982 EARLY DEVELOPMENT OF LONGLEAF PINE PLANTED ON PREPARED SITES IN THE EAST GULF USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:109-117 PAPER NO. 106	SITE PREPARATION	-	X	-	-	-	-
FISHER, R. F. 1980 SOILS INTERPRETATIONS FOR SILVICULTURE IN THE SOUTHEASTERN COASTAL PLAIN USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:323-330 PAPER NO. 175	MULTIPLE		X	X	-	-	-

TIMBER MODEL - CITATIONS FOR LONGLEAF PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
FISHER, RICHARD P. 1981 A PRELIMINARY GUIDE TO MAINTAINING & IMPROVING POREST SITE PRODUCTIVITY IN SE A REPORT POR USPS REGION 8 PAPER NO. 243	MULTIPLE	-	-	-	-	-	-
GRELEN, HAROLD E. 1983 MAY BURNING FAVORS SURVIVAL & EARLY HEIGHT GROWTH OF LONGLEAF PINE SEEDLINGS SOUTHERN JOURNAL OP APPLIED FORESTRY 7(1):16-20 PAPER NO. 103	SITE PREPARATION	-	X	-	-	-	-
HALLS, L. K. ET AL 1956 GRAZING CAPACITY OF WIREGRASS--PINE RANGES OP GEORGIA GEORGIA AGRIC EXP STA, UNIV OF GEORGIA COL OP AGRIC, TECHNICAL BULLETIN N.S. 2 PAPER NO. 413	-	-	-	-	-	-	B
LEWIS, CLIPFORD E. 1972 CHOPPING AND WEBBING CONTROL SAW-PALMETTO IN SOUTH FLORIDA USPS SE-177 RESEARCH NOTE PAPER NO. 328	RANGE REHABILITATION	-	-	-	-	-	-
LUNDGREN, GWYNNE K. ET AL 1983 AN ECONOMIC ANALYSIS OF FOREST GRAZING ON FOUR TIMBER MANAGEMENT SITUATIONS SOUTHERN JOURNAL OF APPLIED FORESTRY 7(3):119-124 PAPER NO. 352	VEGETATIVE MGMT	X	-	X	-	-	B,C,IRR

TIMBER MODEL - CITATIONS FOR LONGLEAF PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
MCKEE, WILLIAM H. 1982 CHANGES IN SOIL FERTILITY FOLLOWING PRESCRIBED BURNING COASTAL PLAIN PINE SITE USFS SE-234 RESEARCH PAPER PAPER NO. 168	SITE PREPARATION	-	-	-	-	-	
MCKEE, WILLIAM H., JR. LEWIS, CLIFFORD E. 1982 INFLU OF BURN/GRAZ ON SOIL NUTRIENT PROP & TREE GROWTH-COAST PLAIN AFTER 40 YR USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:79-86 PAPER NO. 102	SITE PREPARATION	-	-	-	-	-	
MCLEOD, KENNETH W. ET AL 1979 RESPONSE OF LONGLEAF PINE PLANTATIONS TO LITTER REMOVAL FOREST ECOLOGY AND MANAGEMENT 2(1979):I-I2 PAPER NO. 110		-	-	-	-	-	-
MICHAEL, J. L. 1980 LONG-TERM IMPACT OF AERIAL APPLICATION OF 2,4,5-T TO LONGLEAF PINE WEED SCIENCE 28(3):255-257 PAPER NO. 101	COMPETITOR CONTROL	-	X	X	-	-	-
MOORE, WILLIAM H. ET AL 1982 VEGETATIVE RESPONSE TO CLEARCUTTING & CHOPPING IN A N FLORIDA FLATWOODS FOREST JOURNAL OF RANGE MANAGEMENT 35(2):214-218 PAPER NO. 326	RANGE REHABILITATION	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
MORRIS, LAWRENCE A. ET AL 1983 DISPLACEMT OF NUTRIENT INTO WINDROWS DURING SITE PREPARATION OF FLATWD FOREST SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 47(1983):591-594 PAPER NO. 165	SITE PREPARATION	-	-	-	-	-	-
PEARSON, HENRY A. 1980 FOREST AND RANGE INTERACTIONS USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:339-342 PAPER NO. 360	-	X	X	-	-	-	B,C,IRR
PEARSON, HENRY A. 1983 FOREST GRAZING IN THE SOUTHERN UNITED STATES OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:247-260 PAPER NO. 358	VEGETATIVE MGMT	-	X	-	-	-	B
SAUCIER, JOSEPH R. ET AL 1981 GREEN WEIGHT, VOLUME, BOARD-FOOT AND CORD TABLES FOR MAJOR SOUTHERN PINES SPP GEORGIA FORESTRY COMMISSION, GEORGIA FOREST RESEARCH PAPER 19 PAPER NO. 235		-	-	-	-	X	-
SCHUMACHER, F. X. COILE, T. S. 1960 GROWTH AND YIELDS OF NATURAL STANDS OF THE SOUTHERN PINES PUBLISHED BY T. S. COILE, INC., DURHAM, N.C. PAPER NO. 283	-	X	-	-	-	X	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
STEWART, RONALD (COMPILER ET AL 1984 EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C
THILL, RONALD E. WOLTERS, GALE L. 1979 CATTLE PRODUCTION ON A SOUTHERN PINE-HARDWOOD FOREST RANGELANDS 1(2):60-61 PAPER NO. 359	VEGETATIVE MGMT	-	-	-	-	-	B,C
TIPPIN, TOM (EDITOR) 1978 PROCEEDINGS: SYMPOSIUM ON PRINCIPLES OF MAINT PRODUCTIVITY ON PREPARED SITES USFS SE AREA STATE & PRIVATE FORESTRY, ATLANTA, GEORGIA PAPER NO. 234	MULTIPLE	-	-	-	-	X	B,C
WALKER, LAURENCE C. PERKINS, HENRY F. 1958 FOREST SOILS AND SILVICULTURE IN GEORGIA SCHOOL OF FORESTRY & COLLEGE OF AGRIC, UNIV OF GEORGIA-ATHENS, REPORT 4 PAPER NO. 233	MULTIPLE	-	-	-	X	-	-
WILLISTON, HAMLIN L. 1977 RELEASE CUTTING IN SOUTHERN FORESTS: ECONOMICAL AND EFFECTIVE STAND CONVERSION USFS FOREST MGMT BULLETIN (NOV 1977) PAPER NO. 104	COMPETITOR CONTROL	-	X	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
WILLISTON, HAMLIN L.	1978						
GROWTH OF UNDERSTOCKED SOUTHERN PINE STANDS							
USFS FOREST MANAGEMENT BULLETIN, SE AREA (FEBRUARY)							
PAPER NO. 11	COMPETITOR CONTROL	X	-	-	-	X	-
WOLTERS, GALE L.	1973						
SOUTHERN PINE OVERSTORIES INFLUENCE HERBAGE QUALITY							
JOURNAL OF RANGE MANAGEMENT 26(6):423-426							
PAPER NO. 364	VEGETATIVE MGMT	-	-	X	-	-	-
WOOD, GENE W.	1986						
INFLUENCES OF FOREST FERTILIZATION ON SOUTH CAROLINA DEER FORAGE QUALITY							
SOUTHERN JOURNAL OF APPLIED FORESTRY 10:203-205							
PAPER NO. 345	FERTILIZATION	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR MAPLES

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
ANDERSON, HENRY W. ET AL 1986 FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
BECK, DONALD E. 1980 EVALUATING A DIAMETER-LIMIT CUT IN S. APPALACHIAN HARDWOODS THROUGH STEM ANAL USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:164-168 PAPER NO. 255	LOGGING SYSTEM	-	-	-	X	-	-
BROADFOOT, W. M. 1967 SHALLOW-WATER IMPOUNDMENT INCREASES SOIL MOISTURE AND GROWTH OF HARDWOODS SOIL SCIENCE SOCIETY OF AMERICA PROC (JULY-AUGUST 1967):562-564 PAPER NO. 195	WATER RETENTION	-	-	X	-	-	-
BUCHMAN, ROLAND G. 1983 SURVIVAL PREDICTIONS FOR MAJOR LAKE STATES TREE SPECIES USFS NC-233 RESEARCH PAPER PAPER NO. 212		X	X	-	-	-	-
CARMEAN, WILLARD H. 1975 FOREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232		-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR MAPLES

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
COVINGTON, W. WALLACE 1981 CHANGES IN FOREST FLOOR ORGANIC MATTER & NUTRIENT CONTENT FOLLOWING CLEAR CUT ECOLOGY 62(1):41-48 PAPER NO. 264	LOGGING SYSTEM	-	-	-	-	-	-
CROW, T. R. ERDMANN, G. G. 1984 WEIGHT AND VOLUME EQUATIONS AND TABLES FOR RED MAPLE IN THE LAKE STATES USFS NC-242 RESEARCH PAPER PAPER NO. 185		-	-	-	-	X	-
CROW, THOMAS R. ET AL 1981 STOCKING & STRUCTURE FOR MAXIMUM GROWTH IN SUGAR MAPLE SELECTION STANDS USFS NC-199 RESEARCH PAPER PAPER NO. 186		X	X	-	-	X	-
LAMSON, NEIL I. UNKWN EFFECT OF FERTILIZATION ON FOUR SPECIES IN MATURE APPALACHIAN HARDWOOD STANDS USFS NE FOREST EXPERIMENT STATION PAPER NO. 192	FERTILIZATION	X	-	-	-	-	-
LEEFERS, LARRY A. ET AL 1987 ECOLOGICAL CLASSIFICATION SYSTEM: INFORMATION AND ECONOMICS TO BE PRESENTED AT CENTRAL HARDWOODS FOREST CONFERENCE, KNOXVILLE, TN (FEB/87) PAPER NO. 202	MULTIPLE	-	-	X	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
OTTAWA NATIONAL FOREST 1987							
FOREST REPORT							
USFS REGION 9							
PAPER NO. 681	FOREST REPORT	-	-	-	-	-	B,C,B/C
SEDELL, JAMES R. PROGGATT, JUDITH L. 1984							
IMPORTANCE OP STREAMSIDE PORESTS TO LARGE RIVERS: INSOLATION WILLAMETTE RVR...							
COPIES AVAILABLE UPON REQUEST							
PAPER NO. 606		-	-	-	-	-	-
STEWART, RONALD (COMPILER ET AL 1984							
EFFECTS OP COMPETING VEGETATION ON PORESt TREES: A BIBLIOGRAPHY WITH ABSTRACTS							
USPS WO-43 GENERAL TECHNICAL REPORT							
PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C
TUBBS, CARL H. 1977							
NORTHERN HARDWOODS IN THE NORTH CENTRAL STATES							
USPS NC-39 GENERAL TECHNICAL REPORT							
PAPER NO. 182	MULTIPLE	X	X	X	-	-	-
VON ALTHEN, P. W. 1972							
EIGHT-YEAR RESULTS OP AN AFPORESTATION STUDY							
THE FORESTRY CHRONICLE (DEC 1972):325-326							
PAPER NO. 183	MULTIPLE	-	X	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
VON ALTHEN, P. W. 1981 SITE PREP & POST-PLANTING WEED CONTROL IN HARDWOOD AFFORESTATION: WHITE ASH... CANADIAN FORESTRY SERVICE REPORT O-X-325 (FEB 1981) PAPER NO. 184	MULTIPLE	-	X	-	-	-	-
WILDE, S. A. 1933 THE RELATION OF SOILS AND FOREST VEGETATION OF THE LAKE STATES REGION ECOLOGY XIV(2):94-105 PAPER NO. 288		-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR OAKS

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
ANDERSON, HENRY W. ET AL 1986 FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
BAILEY, TOM 1984 BARE SOIL AND FMC 180 LOGGING VEHICLE ON STEEP SLOPES IN VIRGINIA USFS JEFFERSON NATIONAL FOREST PAPER NO. 675	FOREST REPORT	-	-	-	-	-	-
BEASLEY, R. SCOTT GRANILLO, ALFREDO B. 1982 SEDIMENT LOSSES FROM FOREST PRACTICES IN THE GULF COASTAL PLAIN OF ARKANSAS USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:461-467 PAPER NO. 465	LOGGING SYSTEM	-	-	-	-	-	-
BECK, DONALD E. 1980 EVALUATING A DIAMETER-LIMIT CUT IN S. APPALACHIAN HARDWOODS THROUGH STEM ANAL USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:164-168 PAPER NO. 255	LOGGING SYSTEM	-	-	-	X	-	-
BROADFOOT, W. M. 1967 SHALLOW-WATER IMPOUNDMENT INCREASES SOIL MOISTURE AND GROWTH OF HARDWOODS SOIL SCIENCE SOCIETY OF AMERICA PROC (JULY-AUGUST 1967):562-564 PAPER NO. 195	WATER RETENTION	-	-	X	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
CARMEAN, WILLARD H. 1975 FOREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232		-	-	-	-	-	-
DALE, MARTIN E. 1972 GROWTH AND YIELD PREDICTIONS FOR UPLAND OAK STANDS - 10 YR AFTER INITIAL THIN USFS NE-241 RESEARCH PAPER PAPER NO. 201		-	-	-	-	X	-
DANIELOVICH, STEVEN J. 1986 HIGH INTENSITY SITE PREP BURNING AFTER CLEARCUTTING IN S. HARDWOODS--EFFECTS MASTERS THESIS - GRADUATE SCHOOL OF CLEMSON UNIVERSITY PAPER NO. 238	SITE PREPARATION	-	X	-	-	-	-
DISSMEYER, GEORGE E. 1985 ECONOMIC IMPACTS OF EROSION CONTROL IN FORESTS SOUTHERN FORESTRY SYMPOSIUM, ATLANTA, GA, NOV 19-21, 1985 PAPER NO. 293	MULTIPLE	X	X	X	X	-	B,C,IRR
EINSPAHR, DEAN MCCOMB, A. L. 1951 SITE INDEX OF OAKS IN RELATION TO SOIL/TOPOGRAPHY IN NORTHEASTERN IOWA JOURNAL OF FORESTRY 49(10):719-723 PAPER NO. 199		-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
GRANEY, D. L. POPE, P. E. 1978 FERTIL INCREASES GROWTH THINNED & NONTHINNED UPLAND OAK STANDS BOSTON MTNS ... USFS SO-243 RESEARCH NOTE PAPER NO. 189	FERTILIZATION	-	-	X	-	-	-
GRANEY, D. L. POPE, P. E. 1978 RESPONSE OF RED OAK & WHITE OAK TO THINNING/FERTILIZATION IN BOSTON MTNS, AR CENTRAL HARDWOOD FOREST CONF II PROC:357-369 PAPER NO. 191	FERTILIZATION	-	-	X	-	-	-
GRANEY, DAVID L. 1982 EFFECT OF THIN/FERTIL ON GROWTH UPLAND OAK STDS IN BOSTON MTS, AR, 7-YR RESULT USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:269-274 PAPER NO. 194	FERTILIZATION	-	-	X	-	-	-
GRANEY, DAVID L. ROGERSON, THOMAS L. 1984 DEVELOP OAK, ASH, CHERRY REPRODUCTION FOLLOWING THINNING & FERTILIZATION... USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:171-177 PAPER NO. 190	FERTILIZATION	X	X	-	-	-	-
HALLS, LOWELL K. SCHUSTER, JOSEPH L. 1965 TREE-HERBAGE RELATIONS IN PINE-HARDWOOD FORESTS OF TEXAS JOURNAL OF FORESTRY 63(4):282-283 PAPER NO. 365		-	-	X	-	-	-

TIMBER MODEL - CITATIONS FOR OAKS

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
HANNAH, PETER R. 1968 ESTIMATING SITE INDEX-WHITE/BLACK OAKS IN INDIANA FROM SOIL/TOPOGRAPHIC FACTOR JOURNAL OF FORESTRY 66(5):412-417 PAPER NO. 200	-	-	-	-	-	-	-
HILT, DONALD E. DALE, MARTIN E. 1982 HEIGHT PREDICTION EQUATIONS FOR EVEN-AGED UPLAND OAK STANDS USFS NE-493 RESEARCH PAPER PAPER NO. 198		-	-	-	X	-	-
JOHNSON, PAUL S. JACOBS, RODNEY D. 1981 N RED OAK REGENERATION AFTER PREHERBICIDED CLEARCUTTING & SHELTERWOOD REMOVAL USFS NC-202 RESEARCH PAPER PAPER NO. 188	MULTIPLE	-	X	-	-	-	-
LAMSON, NEIL I. UNKWN EFFECT OF FERTILIZATION ON FOUR SPECIES IN MATURE APPALACHIAN HARDWOOD STANDS USFS NE FOREST EXPERIMENT STATION PAPER NO. 192	FERTILIZATION	X	-	-	-	-	-
LEEFERS, LARRY A. ET AL 1987 ECOLOGICAL CLASSIFICATION SYSTEM: INFORMATION AND ECONOMICS TO BE PRESENTED AT CENTRAL HARDWOODS FOREST CONFERENCE, KNOXVILLE, TN (FEB/87) PAPER NO. 202	MULTIPLE	-	-	X	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
O'HARA, KEVIN L.	1986						
DEVELOPMENTAL PATTERNS RESIDUAL OAK & OAK/YELLOW-POPLAR REGEN AFTER RELEASE							
SOUTHERN JOURNAL OF APPLIED FORESTRY 10:244-248							
PAPER NO. 193	COMPETITOR CONTROL	-	X		-	-	-
PLASS, WILLIAM T. GREEN, ALAN W.	1963						
PREPLANTING TREATMENTS FOR BRUSHY OLD FIELDS IN SOUTHERN ILLINOIS							
USFS CS-1 RESEARCH PAPER							
PAPER NO. 196	COMPETITOR CONTROL	-	X	-	-	-	-
SANDER, IVAN L.	1977						
OAKS IN THE NORTH CENTRAL STATES							
USFS NC-37 GENERAL TECHNICAL REPORT							
PAPER NO. 187	MULTIPLE	X	X	-	X	X	-
SEIFERT, J. R. ET AL	1984						
EFFECTS OF 3 LEVELS SITE PREP ON PLANTED SWAMP CHESTNUT OAK ON POOR DRAIN SITE							
USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF:53-56							
PAPER NO. 197	SITE PREPARATION		X	-	-	-	-
STEWART, RONALD (COMPILER ET AL	1984						
EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS							
USFS WO-43 GENERAL TECHNICAL REPORT							
PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C

TIMBER MODEL - CITATIONS FOR OAKS

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
TUBBS, CARL H. 1977 NORTHERN HARDWOODS IN THE NORTH CENTRAL STATES USFS NC-39 GENERAL TECHNICAL REPORT PAPER NO. 182	MULTIPLE	X	X	X	-	-	-
UNKNOWN 1985 MANAGEMENT OF AN OAK-TULIP POPLAR STAND ON THE MICHAUX STATE FOREST MICHAUX STATE FOREST, PRESENTED TO USDA FS REGION 9 PAPER NO. 676	FOREST REPORT	-	-	-	-	-	B,C,B/C
WILDE, S. A. 1933 THE RELATION OF SOILS AND FOREST VEGETATION OF THE LAKE STATES REGION ECOLOGY XIV(2):94-105 PAPER NO. 288		-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR PONDEROSA PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
ALEXANDER, E. B. ET AL 1985 COMPARISON STEINBRENNER AIR PERMEAMETER PRESSURE LOSS & SURFACE SOIL POROSITY USFS, REGION 5, EARTH RESOURCES NOTE PAPER NO. 74	MULTIPLE	-	X	-	-	-	-
ALEXANDER, ROBERT R. 1986 SILVIC SYS & CUT METHODS FOR PONDEROSA FORESTS IN FRONT RANGE CTRL ROCKY MTNS USFS RM-128 GENERAL TECHNICAL REPORT PAPER NO. 87	MULTIPLE	X	-	-	-	-	-
ANDERSON, HENRY W. ET AL 1986 FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
ATZET, THOMAS AMARANTHUS, MIKE 1985 SOIL MOISTURE RETENTION PROGRAM USFS REGION 6, SISKIYOU NATIONAL FOREST R6-ECOL-209-1986 PAPER NO. 703	FOREST REPORT	-	X	-	-	-	-
BAKER, MALCHUS B., JR. 1981 HYDROLOGIC REGIMES OF THREE VEGETATION TYPES ACROSS THE MOGOLLON RIM AM SOC CIVIL ENGINEERS PROC: HYDRO & WATER RES IN AZ & SW. VOL. 11:5-12 PAPER NO. 487	VEGETATIVE MGMT	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR PONDEROSA PINE

CITATION	PRACTICE		STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
BAKER, MALCHUS B., JR. HYDROLOGIC REGIMES OP PORESTED AREAS IN THE BEAVER CREEK WATERSHED USFS RM-90 GENERAL TECHNICAL REPORT PAPER NO. 517	GENERAL	1982	-	-	-	-	-	-
BAKER, MALCHUS B., JR. EPPECTS OP PONDEROSA PINE TREATMENTS ON WATER YIELD IN ARIZONA WATER RESOURCES RESEARCH 22(1):67-73 PAPER NO. 488	VEGETATIVE MGMT	1986	-	-	-	-	-	-
BARRETT, JAMES W. SILVICULTURE OP PONDEROSA PINE IN PACIFIC NORTHWEST: STATE OP OUR KNOWLEDGE USFS PNW-97 GENERAL TECHNICAL REPORT PAPER NO. 86	MULTIPLE	1979	X	X	X	X	X	-
BRENDEMUEHL, R. H. OPTIONS FOR MANAGEMENT OP SANDHILL FOREST LAND SOUTHERN JOURNAL OP APPLIED PORESTRY 5(4):216-222 PAPER NO. 254		1981	-	-	-	-	-	-
CARMEAN, WILLARD H. POREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232		1975	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR PONDEROSA PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
CHRISTENSEN, M. DALE ET AL 1974 CONTROL OF ANNUAL GRASSES AND REVEGETATION IN PONDEROSA PINE WOODLANDS JOURNAL OF RANGE MANAGEMENT 27(2):143-145 PAPER NO. 329	RANGE REHABILITATION	-	X	-	-	-	-
CLARY, WARREN P. 1964 METHOD FOR PREDICTING POTENTIAL HERBAGE YIELD ON BEAVER CREEK PILOT WATERSHEDS AMERICAN SOCIETY OF AGRONOMY, ASA SPECIAL PUBLICATION 5(OCT 1964):244-250 PAPER NO. 385	RANGE REHABILITATION	-	-	-	-	-	-
CLARY, WARREN P. ET AL 1968 RELATIONSHIP OF DIFFERENT FOREST FLOOR LAYERS TO HERBAGE PRODUCTION USFS RM-123 RESEARCH NOTE PAPER NO. 383	VEGETATIVE MGMT	-	-	-	-	-	-
CLARY, WARREN P. 1969 INCREAS SAMPLING PRECISION FOR HERBAGE VARIABLES THRU KNOWLEDGE TMBR OVERSTORY JOURNAL OF RANGE MANAGEMENT 22(3):200-201 PAPER NO. 389		-	-	-	-	-	-
CLARY, WARREN P. ET AL 1975 CATTLE GRAZING & WOOD PRODUCTION WITH DIFFERENT BASAL AREAS OF PONDEROSA PINE JOURNAL OF RANGE MANAGEMENT 28(6):434-437 PAPER NO. 363	VEGETATIVE MGMT	-	-	X	-	-	B,C,B/C

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
CLARY, WARREN P. 1975 RANGE MGMT & ITS ECOL BASIS IN PONDEROSA PINE TYPE OF AZ: STATUS OF KNOWLEDGE USFS RM-158 RESEARCH PAPER PAPER NO. 404		-	-	-	-	-	B,C
CLARY, WARREN P. ET AL 1978 FACTORS AFFECTING FORAGE CONSUMPTION BY CATTLE IN AZ PONDEROSA PINE FORESTS JOURNAL OF RANGE MANAGEMENT 31(1):9-10 PAPER NO. 394	MULTIPLE	-	-	-	-	-	-
CLAYTON, JAMES L. ET AL UNKWN SOIL DISTURBANCE - PRODUCTIVITY RELATIONS IN CENTRAL IDAHO CLEARCUTS USFS REGION 4 PAPER NO. 151	MULTIPLE	-	X	-	-	-	-
COCHRAN, P. H. BROCK, TERRY 1985 SOIL COMPACTION AND INITIAL HEIGHT GROWTH OF PLANTED PONDEROSA PINE USFS PNW-434 RESEARCH NOTE PAPER NO. 94	LOGGING SYSTEM	-	X	-	-	-	-
COVINGTON, W. W. SACKETT, S. S. 1986 EFFECT OF PERIODIC BURNING ON SOIL NITROGEN CONCENTRATIONS IN PONDEROSA PINE SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 50(2):452-457 PAPER NO. 88	SITE PREPARATION	-	X	X	-	-	-

TIMBER MODEL - CITATIONS FOR PONDEROSA PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
COX, G. S. ET AL 1960 PONDEROSA PINE PRODUCTIVITY IN RELATION TO SOIL & LANDFORM IN WESTERN MONTANA SOIL SCIENCE SOCIETY OF AMERICA PROC 24(1960):139-142 PAPER NO. 98		X	-	-	-	-	-
CROUCH, GLENN L. 1979 ATRAZINE IMPROVES SURVIVAL/GROWTH PONDEROSA PINE THREATENED BY VEG COMPETITION FOREST SCIENCE 25(1):99-111 PAPER NO. 78	COMPETITOR CONTROL	-	X	-	-	-	-
CURRIE, PAT O. 1975 GRAZING MGMT OF PONDEROSA PINE-BUNCHGRASS RANGES OF CENTRAL ROCKY MOUNTAINS USPS RM-159 RESEARCH PAPER PAPER NO. 401	MULTIPLE	-	-	-	-	-	-
DISSMEYER, GEORGE E. POSTER, BENNETT 1987 SOME ECONOMIC BENEFITS OF PROTECTING WATER QUALITY (IN A PROCEEDINGS) USPS SO-65 GENERAL TECHNICAL REPORT PAPER NO. 289	MULTIPLE	-	X	-	-	-	B,C,B/C,IRR
PFOLLIOTT, PETER F. CLARY, WARREN P. 1974 PREDICTING HERBAGE PRODUCTION FROM FOREST GROWTH IN ARIZONA PONDEROSA PINE PROGRESSIVE AGRICULTURE IN ARIZONA 26(3):3-5 PAPER NO. 384	VEGETATIVE MGMT	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR PONDEROSA PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
FFOLLIOTT, PETER F. CLARY, WARREN P. 1975 DIPP IN HERBAGE-TIMBER RELATION ON SEDIMENTARY & IGNEOUS SOILS IN AZ PONDEROSA PROGRESSIVE AGRICULTURE IN ARIZONA 27(5):6-7 PAPER NO. 396		-	-	-	-	-	-
FFOLLIOTT, PETER P. ET AL 1977 EPFECTS OP A PRESCRIBED PIRE IN AN ARIZONA PONDEROSA PINE POREST USFS RM-336 RESEARCH NOTE PAPER NO. 320	RANGE REHABILITATION	-	-	-	-	-	B
FISKE, JOHN N. 1984 ESTIM EPPECT OP COMPETING PLANTS ON CONIPER GRWTH/YIELD-DETERMIN RELEASE NEEDS 6TH ANNUAL POREST VEGETATION MANAGEMENT CONP PROC:129-143 PAPER NO. 249	COMPETITOR CONTROL	-	-	-	-	-	-
FROEHLICH, H. A. ET AL 1986 GROWTH OP YOUNG PINUS PONDEROSA & CONTORTA ON COMPACTED SOIL IN CENTRAL WA POREST ECOLOGY AND MGMT 15(1986):285-294 PAPER NO. 89	SKID TRAILS	-	X	-	-	-	-
FROEHLICH, HENRY A. 1979 SOIL COMPACTION PROM LOGGING EQUIP: EPFECTS ON GROWTH OP YOUNG PONDEROSA PINE JOURNAL OP SOIL AND WATER CONSERVATION (NOV-DEC 1979):276-278 PAPER NO. 75	SKID TRAILS	-	X	-	-	-	-

TIMBER MODEL - CITATIONS FOR PONDEROSA PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
FROEHLICH, HENRY A. (UNKWN) EFFECT OF SOIL COMPACTION BY LOGGING ON FOREST PRODUCTIVITY BLM, CONTRACT # 53500-CT4-5(N), PORTLAND, OR PAPER NO. 127	SKID TRAILS	-	X	X	-	-	-
GARRETT, LAWRENCE D. (1981) MULTIRESOURCE RESEARCH & ITS IMPLICATIONS TO MGMT: THE BEAVER CREEK BIOSPHERE WORKSHOP ON WILDLIFE & RANGE RES NEEDS IN N MEXICO & SW US, RIO RICO AZ:40-44 PAPER NO. 525		-	-	-	-	-	-
GARY, HOWARD L. (1975) WATERSHED MGMT PROBLEMS & OPPORTUNITIES FOR COLORADO FRONT RANGE PONDEROSA PIN USFS RM-139 RESEARCH PAPER PAPER NO. 725	GENERAL WATERSHED MGMT	-	-	-	-	-	-
GOTTFRIED, GERALD J. (1980) CONTROL NEW MEXICAN LOCUST & EFFECT ON PLANTED PONDEROSA PINE-CENTRAL ARIZONA USFS RM-386 RESEARCH NOTE PAPER NO. 92	COMPETITOR CONTROL	-	X	-	-	-	-
HALL, FREDERICK C. (1983) APPLICATION AND INTERPRETATION OF FOREST ECOSYSTEMS CLASSIFICATION FORESTLAND GRAZING, SYMPOSIUM PROC, WASHINGTON STATE UNIV EXTENSION SVC:7-14 PAPER NO. 361	GENERAL PAPER	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
HARRIS, GARY R. COVINGTON, W. WALLACE 1983 EFFECT OF PRESCRIBED FIRE ON NUTRIENT CONC/STAND CROP UNDERSTORY VEG-PONDEROSA CANADIAN JOURNAL OF FOREST RESEARCH 13:501-507 PAPER NO. 76	SITE PREPARATION	-	X	X	-	-	-
HEEDE, BURCHARD H. 1984 SEDIMENT SOURCE AREAS RELATED TO TIMBER HARVEST ON SELECTED ARIZONA WATERSHEDS SYMPOSIUM ON EFFECTS OF FOREST LAND USE ON EROSION & SLOPE STABILITY:123-130 PAPER NO. 472	LOGGING SYSTEM	-	-	-	-	-	-
HEEDE, BURCHARD H. 1984 OVERLAND FLOW & SEDIMENT DELIVERY: EXP WITH SMALL SUBDRAINAGE IN SW PONDEROSA JOURNAL OF HYDROLOGY 72:261-273 PAPER NO. 548	ROADS	-	-	-	-	-	-
HEIDMANN, L. J. ET AL 1982 ESTABLISHING NATURAL REGENERATION OF PONDEROSA PINE IN CENTRAL ARIZONA JOURNAL OF FORESTRY 80(2):77-79 PAPER NO. 91	REFORESTATION	-	-	-	-	-	B,C
HEIDMANN, L. J. 1984 FERTILIZATION INCREASE CONE PRODUCT IN 55-YR-OLD PONDEROSA STAND IN CENTRAL AZ FOREST SCIENCE 30(4):1079-1083 PAPER NO. 82	FERTILIZATION	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
HEIDMANN, L. J. 1985 HEAVY FERT INCREASE DIAMETER GROWTH SLIGHTLY IN 55-YR-OLD PONDEROAS PINE STAND USFS RM-452 RESEARCH NOTE PAPER NO. 83	FERTILIZATION	-	-	X	-	-	-
HEIDMANN, L. J. 1985 PONDEROSA PINE REGENERATION IN THE SOUTHWEST SOCIETY OF AMERICAN FORESTERS NATIONAL CONVENTION PROC:228-232 PAPER NO. 95	MULTIPLE	-	-	-	-	-	B,C
HELMS, J. A. HIPKIN, C. 1986 EFFECTS OF SOIL COMPACTION ON HEIGHT GROWTH OF CA PONDEROSA PINE PLANTATION WESTERN JOURNAL OF APPLIED FORESTRY 1(4):104-108 PAPER NO. 96	SKID TRAILS	-	-	-	X	-	-
HIBBERT, ALDEN R. 1979 MANAGING VEGETATION TO INCREASE FLOW IN THE COLORADO RIVER BASIN USFS RM-66 GENERAL TECHNICAL REPORT PAPER NO. 510	VEGETATIVE MGMT	-	-	-	-	-	B,C
HIBBERT, ALDEN R. UNKWN OPPORTUNITIES TO INCREASE WATER YLD IN THE SOUTHWEST BY VEGETATION MANAGEMENT USFS RM, TEMPE, ARIZONA PAPER NO. 514	VEGETATIVE MGMT	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
KLOCK, GLEN O.	1975						
IMPACT OF FIVE POSTFIRE SALVAGE LOGGING SYSTEMS ON SOILS AND VEGETATION							
JOURNAL OF SOIL AND WATER CONSERVATION 30(2):78-81							
PAPER NO. 113	LOGGING SYSTEM	-	-	-	-	-	-
LEAF, CHARLES F.	1975						
WATERSHED MGMT IN CENTRAL & SOUTHERN ROCKY MTNS: SUMMARY OF STATUS OF KNOWLEDG							
USFS RM-142 RESEARCH PAPER							
PAPER NO. 723	GENERAL WATERSHED MGMT	-	-	-	-	-	-
LUCKOW, KEN -	1986						
TIMBER STAND NUTRIENT STATUS INVENTORY							
USFS MODAC NATIONAL FOREST							
PAPER NO. 712	FERTILIZATION	-	X	X	-	-	-
MCDONALD, PHILIP M.	1986						
GRASSES IN YOUNG CONIFER PLANTATIONS - HINDRANCE AND HELP							
NORTHWEST SCIENCE 60(4):271-278							
PAPER NO. 367	VEGETATIVE MGMT	-	X	X	-	-	-
MCKAY, NEIL	1985						
A STOCKABILITY EQUATION FOR FOREST LAND IN SISKIYOU COUNTY, CALIFORNIA							
USFS PNW-435 RESEARCH NOTE							
PAPER NO. 274		X	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
MCLEAN, ALASTAIR 1983 PRODUCING FORAGE FOR LIVESTOCK ON FOREST RANGES OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:175-183 PAPER NO. 382	VEGETATIVE MGMT	X	X	-	-	-	-
MILES, SCOTT R. POWERS, ROBERT F. 1983 FERTILIZING CALIFORNIA FORESTS WITH NITROGEN ... PRELIMINARY GUIDELINES USFS, REGION 5, (NOVEMBER 1983) PAPER NO. 77	FERTILIZATION	-	-	-	-	-	B,C,B/C
MYERS, CLIFFORD A. VAN DEUSEN, JAMES L. 1960 SITE INDEX OF PONDEROSA PINE IN THE BLACK HILLS FROM SOIL AND TOPOGRAPHY JOURNAL OF FORESTRY 58(6):548-555 PAPER NO. 97		-	-	-	-	-	-
OLIVER, WILLIAM W. POWERS, ROBERT F. 1978 GROWTH MODELS FOR PONDEROSA PINE: I. YIELD OF UNTHINNED PLANTATIONS IN N CALIF USFS PSW-133 RESEARCH PAPER PAPER NO. 750	GROWTH MODELS	-	X	X	X	-	-
ORR, HOWARD K. 1975 WATERSHED MANAGEMENT IN THE BLACK HILLS: THE STATUS OF OUR KNOWLEDGE USFS RM-141 RESEARCH PAPER PAPER NO. 724	GENERAL WATERSHED MGMT	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR PONDEROSA PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
OSWALD, BRIAN P. COVINGTON, W. WALLACE 1984 EFFECT OF PRESCRIBED FIRE ON HERBAGE PRODUCT IN SW PONDEROSA ON SEDIMENT SOILS FOREST SCIENCE 30(1):22-25 PAPER NO. 321	RANGE REHABILITATION	-	-	-	-	-	-
PAULSEN, HAROLD A., JR. 1975 RANGE MGMT IN CENTRAL & SOUTHERN ROCKY MTNS: SUMMARY OF STATUS OF KNOWLEDGE USFS RM-154 RESEARCH PAPER PAPER NO. 403	MULTIPLE	-	-	-	-	-	B,C
PEARSON, H. A. ET AL 1972 EFFECTS OF WILDFIRE ON TIMBER & FORAGE PRODUCTION IN ARIZONA JOURNAL OF RANGE MANAGEMENT 25(4):250-253 PAPER NO. 80	RANGE REHABILITATION	-	-	-	-	-	-
PEARSON, HENRY A. JAMESON, DONALD A. 1967 RELATIONSHIP BETWEEN TIMBER & CATTLE PRODUCTION ON PONDEROSA PINE RANGE... USFS RM, HANDOUT FOR FIELD TRIPS; NOT A PUBLICATION PAPER NO. 366	VEGETATIVE MGMT	-	-	-	-	-	-
PEARSON, HENRY A. 1971 ESTIM CATTLE GAINS FROM CONSUMPTION OF DIGESTIBLE FORAGE ON PONDEROSA PINE RNG JOURNAL OF RANGE MANAGEMENT 25(1):18-20 PAPER NO. 392		-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
PEARSON, HENRY A. 1973							
CALCULATING GRAZING INTENSITY FOR MAX PROFIT ON PONDEROSA PINE RANGE IN N. AZ							
JOURNAL OF RANGE MANAGEMENT 26(4):277-278							
PAPER NO. 373	GRAZING SYSTEM	-	-	-	-	-	B,C
POWERS, ROBERT F. JACKSON, GRANT D. 1978							
PONDEROSA PINE RESPONSE TO FERTILIZATION: INFLUENCE OF BRUSH REMOVAL/SOIL TYPE							
USFS PSW-132 RESEARCH PAPER							
PAPER NO. 81	MULTIPLE	-	-	-	-	-	-
POWERS, ROBERT F. 1983							
FOREST FERTILIZATION RESEARCH IN CALIFORNIA							
USFS PNW-163 GENERAL TECHNICAL REPORT							
PAPER NO. 84	FERTILIZATION	-	X	X	-	-	-
POWERS, ROBERT F. ET AL UNKWN							
ESTIMATING THE RESPONSE OF PONDEROSA PINE FORESTS TO FERTILIZATION							
COPIES AVAILABLE UPON REQUEST							
PAPER NO. 85	FERTILIZATION	-	X	X	-	-	-
RICH, LOWELL R. THOMPSON, J. R. 1974							
WATERSHED MANAGEMENT IN ARIZONA'S MIXED CONIFER FORESTS: STATUS OF OUR KNOWLED							
USFS RM-130 RESEARCH PAPER							
PAPER NO. 727	GENERAL WATERSHED MGMT	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR PONDEROSA PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
RIITTERS, KURT ET AL 1982 DYNAMIC PROGRAMMING OPTIMIZATION TIMBER PRODUCTION & GRAZING IN PONDEROSA PINE FOREST SCIENCE 28(3):517-526 PAPER NO. 100	VEGETATIVE MANAGEMENT	-	-	-	-	-	B,C
RYAN, MICHAEL G. COVINGTON, W. WALLACE 1986 EFFECT PRESCRIBED BURN IN PONDEROSA ON INORGANIC N CONCENTRATION-MINERAL SOIL USFS RM-464 RESEARCH NOTE PAPER NO. 79	SITE PREPARATION	-	X	X	-	-	-
SACKETT, STEPHEN S. 1984 OBSERVATION ON NATURAL REGEN IN PONDEROSA PINE FOLLOWING PRESCRIBED FIRE IN AZ USFS RM-435 RESEARCH NOTE PAPER NO. 90	SITE PREPARATION	-	X	-	-	-	-
SHEPPERD, WAYNE D. MCELDERRY, SUE E. 1986 TEN-YEAR RESULTS OF A PONDEROSA PINE PROGENY TEST IN THE BLACK HILLS WESTERN JOURNAL OF APPLIED FORESTRY 1(3):79-83 PAPER NO. 93		-	X	-	-	-	-
SMITH, DWIGHT R. 1967 EFFECTS OF CATTLE GRAZING ON A PONDEROSA PINE-BUNCHGRASS RANGE IN COLORADO USFS TECHNICAL BULLETIN 1371 PAPER NO. 412	GRAZING SYSTEM	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR PONDEROSA PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
STEWART, RONALD (COMPILER ET AL 1984 EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C
TAPPEINER II, J. C. ET AL 1986 PART 2, PACIFIC COAST, THE NEXT 30 YEARS - SILVICULTURE - THE PAST 30 YEARS JOURNAL OF FORESTRY 84(5):37-46 PAPER NO. 248	MULTIPLE	-	-	-	-	-	-
TIEDEMANN, ARTHUR R. KLOCK, GLEN O. 1973 1ST-YR VEG AFTER FIRE, RESEEDING, FERTILIZATION ON ENTIAT EXPERIMENTAL FOREST USFS PNW-195 RESEARCH NOTE PAPER NO. 130	MULTIPLE	-	-	-	-	-	-
TURNER, JAMES M. LARSON, FREDERIC R. 1974 COST ANALYSIS OF EXPERIMENTAL TREATMENTS ON PONDEROSA PINE WATERSHEDS USFS RM-116 RESEARCH PAPER PAPER NO. 99	LOGGING SYSTEM	-	-	-	-	-	C
WARD, TIMOTHY J. BAKER, MALCHUS B., JR. 1984 SEDIMENT FROM MANAGED PINE WATERSHED IN NORTHERN CENTRAL ARIZONA CONF PROC SPONSORED BY IRRIG & DRAIN DIV, AM SOC CIV ENGINEERS:552-558 PAPER NO. 474	LOGGING SYSTEM	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
WITTENKAMP, R. WILDE, S. A. 1964 EFFECT OF CULTIVATION ON THE GROWTH OF RED PINE PLANTATIONS JOURNAL OF FORESTRY (JAN 1964):35-37 PAPER NO. 209	COMPETITOR CONTROL	-	-	-	-	-	-
ZINKE, PAUL J. 1958 SITE QUALITY DOUG-FIR/PONDEROSA PINE IN NW CA AS RELATED TO CLIMATE, TOPO,SOIL SOCIETY OF AMERICAN FORESTERS MEETING PROC (1958):167-171 PAPER NO. 142		-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR RED PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
ALBAN, DAVID H. PRETTYMAN, DONALD H. 1984 HEIGHT GROWTH OF RED PINE ON FINE-TEXTURED SOILS USFS NC-249 RESEARCH PAPER PAPER NO. 215		-	-	-	X	-	-
BENZIE, JOHN W. 1977 RED PINE IN THE NORTH CENTRAL STATES USFS NC-33 GENERAL TECHNICAL REPORT PAPER NO. 208	MULTIPLE	X	-	-	X	X	-
BUCHMAN, ROLAND G. 1983 SURVIVAL PREDICTIONS FOR MAJOR LAKE STATES TREE SPECIES USFS NC-233 RESEARCH PAPER PAPER NO. 212		X	X	-	-	-	-
CARMEAN, WILLARD H. 1975 FOREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232		-	-	-	-	-	-
HILT, DONALD E. 1985 OAKSIM: INDIVIDUAL-TREE GROWTH & YIELD SIMULATOR FOR MANAGED, EVEN-AGED, UPLAN USFS NE-562 RESEARCH PAPER PAPER NO. 679	COMPUTER PROGRAMS	X	-	-	-	X	-

CITATION		PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
HILT, DONALD E.	1985							
USER'S GUIDE TO OAKSIM, INDIVIDUAL-TREE GROWTH & YIELD SIMULATOR FOR MANAGED,								
USFS NE-104 GENERAL TECHNICAL REPORT								
PAPER NO. 680		COMPUTER PROGRAMS	X	-	-	-	X	-
IYER, J. G.	UNKWN							
WEEDS ON PLAINFIELD & HIAWATHA SANDY SOILS OF WISCONSIN, THEIR IMPACT ON REFOR								
UNIV OF WISCONSIN, SCHOOL OF NATURAL RESOURCES, FORESTRY RESEARCH NOTES 189								
PAPER NO. 211		COMPETITOR CONTROL	-	-	-	-	-	-
LOTHNER, DAVID C. BRADLEY, DENNIS P.	1984							
A NEW LOOK AT RED PINE FINANCIAL RETURNS IN THE LAKE STATES								
USFS NC-246 RESEARCH PAPER								
PAPER NO. 222			-	-	-	-	-	B,C,IRR
LUNDGREN, ALLEN L.	1981							
EFFECT INITIAL NUMBER OF TREES/AC & THINNING DENSITIES ON TIMBER YLD, RED PINE								
USFS NC-193 RESEARCH PAPER								
PAPER NO. 214			X		-	X	-	-
MINER, CYNTHIA L. WALTERS, NANCY R.	1984							
STEMS: A NONTECHNICAL DESCRIPTION FOR FORESTERS								
USFS NC-252 RESEARCH PAPER								
PAPER NO. 678		COMPUTER PROGRAMS	X	-	-	-	X	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
OTTAWA NATIONAL FOREST 1987 FOREST REPORT USFS REGION 9 PAPER NO. 681	FOREST REPORT	-	-	-	-	-	B,C,B/C
RAWINSKI, JOHN J. ET AL 1980 SOIL PROPERTIES RELATED TO CONIFEROUS SEEDLING HEIGHT GROWTH IN N. WISCONSIN USFS NC-254 RESEARCH NOTE PAPER NO. 213		-	X	-	-	-	-
SANDER, IVAN L. 1977 OAKS IN THE NORTH CENTRAL STATES USFS NC-37 GENERAL TECHNICAL REPORT PAPER NO. 187	MULTIPLE	X	X	-	X	X	-
ST. CLAIR, JOHN BRADLEY 1984 ECONOMIC EVALUATION OF LAKE STATES TREE IMPROVEMENT PROGRAMS MASTERS THESIS, UNIV OF WISCONSIN-MADISON PAPER NO. 223		-	-	-	-	-	B,C,B/C,IRR
STEWART, RONALD (COMPILER ET AL 1984 EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
UNKNOWN UNKWN FOREST REPORT USFS REGION 9 PAPER NO. 677	FOREST REPORT	X	-	-	-	X	-
WILDE, S. A. 1961 THE SOIL-AMELIORATING EFFECT OF JACK PINE AND RED PINE PLANTATIONS RECENT ADVANCES IN BOTANY, UNIV OF TORONTO PRESS, CANADA PAPER NO. 218		-	-	-	-	-	-
WILDE, S. A. 1964 CHANGES IN SOIL PRODUCTIVITY INDUCED BY PINE PLANTATIONS SOIL SCIENCE 97(4):276-278 PAPER NO. 217		-	-	-	-	-	-
WILDE, S. A. ET AL 1964 GROWTH RED PINE PLANTATION IN RELATION TO FERTILITY OF NON-PHREATIC SANDY SOIL FOREST SCIENCE 10(4):463-470 PAPER NO. 219		-	-	-	X	-	-
WILDE, S. A. VOIGT, G. K. 1967 EFFECT OF DIFF METHODS TREE PLANTING ON SURVIVAL/GROWTH OF PINE ON CLAY SOILS JOURNAL OF FORESTRY 65(2):99-101 PAPER NO. 220		-	X	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
WILDE, S. A. ET AL 1968 WEEDS AS A FACTOR DEPRESSING FOREST GROWTH WEED RESEARCH 8(3):196-204 PAPER NO. 210	COMPETITOR CONTROL	-	-	X	-	-	-
WILDE, S. A. 1970 SOILS AND FOREST GROWTH: THEIR RELATIONSHIP IN TERMS OF REGRESSION ANALYSIS BIO SCIENCE (JAN 15, 1970):101-102 PAPER NO. 206		-	-	-	-	-	-
WILDE, S. A. 1970 GROWTH POTENTIAL OF WISCONSIN NATIVE PINES ON WEED-INVADED SOILS WISCONSIN ACADEMY OF SCIENCES, ARTS & LETTERS 58(1970):197-202 PAPER NO. 216		-		-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
BRENDEMUEHL, R. H. 1981 OPTIONS FOR MANAGEMENT OF SANDHILL FOREST LAND SOUTHERN JOURNAL OF APPLIED FORESTRY 5(4):216-222 PAPER NO. 254		-	-	-	-	-	-
HEBB, EDWIN A. 1981 CHOCTAWHATCHEE SAND PINE GROWTH ON A CHEMICALLY PREPARED SITE--10-YR RESULTS SOUTHERN JOURNAL OF APPLIED FORESTRY 5(4):208-211 PAPER NO. 244	SITE PREPARATION	-	-	-	-	-	-
SCHUMACHER, F. X. COILE, T. S. 1960 GROWTH AND YIELDS OF NATURAL STANDS OF THE SOUTHERN PINES PUBLISHED BY T. S. COILE, INC., DURHAM, N.C. PAPER NO. 283		X	-	-	-	X	-
STEWART, RONALD (COMPILER ET AL 1984 EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
ALLEN, H. LEE BALLARD, RUSS 1983 FOREST FERTILIZATION OF LOBLOLLY PINE N. CAROLINA STATE FOREST FERTILIZATION COOPERATIVE, REPORT # 14 PAPER NO. 4	FERTILIZATION	-	-	X	-	-	-
ANDERSON, HENRY W. ET AL 1986 FORESTS & WATER: EFFECT OF FOREST MGMT ON FLOODS, SEDIMENTATION & WATER SUPPLY USFS PSW-18 GENERAL TECHNICAL REPORT PAPER NO. 719	GENERAL WATERSHED MGMT	-	-	-	-	-	-
BALMER, WILLIAM E. WILLISTON, HAMLIN L. 1975 EARLY CONSIDERATIONS IN PINE MANAGEMENT USFS FOREST MANAGEMENT BULLETIN, SE AREA (OCTOBER) PAPER NO. 10	MULTIPLE	-	X	-	-	-	-
BARNES, ROBERT L. RALSTON, CHARLES W. 1955 SOIL FACTORS RELATED TO GROWTH AND YIELD OF SLASH PINE PLANTATIONS FLORIDA AGRICULTURAL STATION BULLETIN 559 PAPER NO. 179		-	X	-	-	-	-
BRENDEMUEHL, R. H. 1981 OPTIONS FOR MANAGEMENT OF SANDHILL FOREST LAND SOUTHERN JOURNAL OF APPLIED FORESTRY 5(4):216-222 PAPER NO. 254		-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR SLASH PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
BRENDEMUEHL, R. H. UNKWN LOSS OF TOPSOIL SLOWS SLASH PINE SEEDLING GROWTH IN FLORIDA SANDHILLS USFS SO-53 RESEARCH NOTE PAPER NO. 176		-	X	-	-	-	-
BROERMAN, F. S. ET AL 1981 SITE PREPARATION AND SLASH PINE PRODUCTIVITY THE MANAGED SLASH PINE ECOSYSTEM PROC (JUNE 1981):131-149 PAPER NO. 170	SITE PREPARATION	-	X	X	-	-	-
CAMPBELL, T. E. 1980 SPOT SEEDING IS EFFECTIVE AND INEXPENSIVE FOR REFORESTING SMALL ACREAGES USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:50-53 PAPER NO. 47		X	X	-	-	-	-
CARMEAN, WILLARD H. 1975 FOREST SITE QUALITY EVALUATION IN THE UNITED STATES ADVANCES IN AGRONOMY 27(1975):209-269 PAPER NO. 232		-	-	-	-	-	-
COMERFORD, N. B. ET AL 1983 ADVANCES IN FOREST FERTILIZATION ON THE SE COASTAL PLAIN USFS PNW-163 GENERAL TECHNICAL REPORT (DEC 1983):370-378 PAPER NO. 160	FERTILIZATION	-	X	X	-	-	-

TIMBER MODEL - CITATIONS FOR SLASH PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
CRUTCHFIELD, DOUGLAS M. UNKWN FERTILIZATION - EFFECT ON PRODUCTIVITY! WESTVACO CORP, GEORGETOWN, SOUTH CAROLINA PAPER NO. 26	FERTILIZATION	X	X	X	-		B,C
DEHR, H. J. MANN, W. F., JR. UNKWN SITE PREPARATION IMPROVES GROWTH OF PLANTED PINES USFS SO RESEARCH NOTE PAPER NO. 166	SITE PREPARATION	-	X	-	-	-	-
DIPPON, DUANE R. SHELTON, JOHN T. 1982 RATE OF RETURN FROM FERTILIZATION OF SEMIMATURE SLASH PINE PLANTATIONS USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:302-310 PAPER NO. 180	FERTILIZATION	-	-	X	-	-	B,C,IRR
DIPPON, DUANE R. MUNSON, KENNETH R. 1984 INFLUENCE VARIOUS ECON COMPONENT ON PROFITABILITY OF MIDROTATION FERTILIZATION USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:351-359 PAPER NO. 181	FERTILIZATION	-	-	X	X	-	B,C
DISSMEYER, GEORGE E. GREIS, JOHN G. 1981 SOUND SOIL AND WATER MANAGEMENT IS GOOD ECONOMICS THE MANAGED SLASH PINE ECOSYSTEM, PROC OF SYMPOSIUM (1981):194-202 PAPER NO. 161	SITE PREPARATION	-	X	-	-	-	B,C,IRR

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
DISSMEYER, GEORGE E. 1985 ECONOMIC IMPACTS OF EROSION CONTROL IN FORESTS SOUTHERN FORESTRY SYMPOSIUM, ATLANTA, GA, NOV 19-21, 1985 PAPER NO. 293	MULTIPLE	X	X	X	X	-	B,C,IRR
FISHER, R. F. 1980 SOILS INTERPRETATIONS FOR SILVICULTURE IN THE SOUTHEASTERN COASTAL PLAIN USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:323-330 PAPER NO. 175	MULTIPLE		X	X	-	-	-
FISHER, RICHARD F. ADRIAN, FREDRICK 1981 BAHIAGRASS IMPAIRS SLASH PINE SEEDLING GROWTH UNIV OF FLORIDA-SCHOOL OF FOREST RES & CONS, TREE PLANTERS' NOTES (SPRING 1981 PAPER NO. 173		-	X	-	-	-	-
FISHER, RICHARD F. 1981 A PRELIMINARY GUIDE TO MAINTAINING & IMPROVING FOREST SITE PRODUCTIVITY IN SE A REPORT FOR USFS REGION 8 PAPER NO. 243	MULTIPLE	-	-	-	-	-	-
FISHER, RICHARD F. 1983 PREDICTING TREE AND STAND RESPONSE TO CULTURAL PRACTICES 6TH NORTH AMERICAN FOREST SOILS CONF:53-65 PAPER NO. 32	MULTIPLE	-	X	X	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
GRELEN, H. E. ET AL 1984 RESPONSE OF SLASH PINE TO GRAZING FROM REGENERATION TO FIRST PULPWOOD THINNING USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:523-527 PAPER NO. 171	GRAZING SYSTEM	X	X	X	-	-	-
HALLS, L. K. ET AL 1956 GRAZING CAPACITY OF WIREGRASS--PINE RANGES OF GEORGIA GEORGIA AGRIC EXP STA, UNIV OF GEORGIA COL OF AGRIC, TECHNICAL BULLETIN N.S. 2 PAPER NO. 413		-	-	-	-	-	B
HEBB, EDWIN A. BURNS, RUSSELL M. 1975 SLASH PINE PRODUCTIVITY & SITE PREPARATION ON FLORIDA SANDHILL SITES USFS SE-135 RESEARCH PAPER PAPER NO. 157	SITE PREPARATION	-	-	-	X	-	-
HOLLIS, CHARLES A. ET AL 1978 EFFECTS OF SOME SILVIC PRACTICES ON SOIL-SITE PROPERTIES IN LOWER COAST PLAINS 5TH NORTH AMERICAN FOREST SOILS CONF PROC:585-606 PAPER NO. 468	LOGGING SYSTEM	-	-	-	-	-	-
KUSHLA, J. D. FISHER, R. F. 1980 PREDICTING SLASH PINE RESPONSE TO NITROGEN AND PHOSPHORUS FERTILIZATION SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 44(6):1303-1306 PAPER NO. 159	FERTILIZATION	-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
LANGDON, O. GORDON MCKEE, WILLIAM H., JR. 1980 CAN FERTILIZATION OF LOBLOLLY PINE ON WET SITES REDUCE THE NEED FOR DRAINAGE USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:212-218 PAPER NO. 21	FERTILIZATION	-	-	X	-	-	B
LEWIS, CLIFFORD E. 1972 CHOPPING AND WEBBING CONTROL SAW-PALMETTO IN SOUTH FLORIDA USFS SE-177 RESEARCH NOTE PAPER NO. 328	RANGE REHABILITATION	-	-	-	-	-	-
LEWIS, CLIFFORD E. ET AL UNKWN FORAGE YIELDS IMPROVED BY SITE PREPARATION IN PINE FLATWOODS OF NORTH FLORIDA SOUTHERN JOURNAL OF APPLIED FORESTRY:181-185 PAPER NO. 354	SITE PREPARATION	-	-	-	-	-	-
LUNDGREN, GWYNNE K. ET AL 1983 AN ECONOMIC ANALYSIS OF FOREST GRAZING ON FOUR TIMBER MANAGEMENT SITUATIONS SOUTHERN JOURNAL OF APPLIED FORESTRY 7(3):119-124 PAPER NO. 352	VEGETATIVE MGMT	X	-	X	-	-	B,C,IRR
MCGEE, CHARLES E. 1961 SOIL SITE INDEX FOR GEORGIA SLASH PINE USFS SE-119 STATION PAPER PAPER NO. 178		-	-	-	-	-	-

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
MCKEE, WILLIAM H. 1982 CHANGES IN SOIL FERTILITY FOLLOWING PRESCRIBED BURNING COASTAL PLAIN PINE SITE USFS SE-234 RESEARCH PAPER PAPER NO. 168	SITE PREPARATION	-	-	-	-	-	-
MCKEE, WILLIAM H., JR. LEWIS, CLIFFORD E. 1982 INFLU OF BURN/GRAZ ON SOIL NUTRIENT PROP & TREE GROWTH-COAST PLAIN AFTER 40 YR USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:79-86 PAPER NO. 102	SITE PREPARATION	-	-	-	-	-	-
MOORE, WILLIAM H. ET AL 1982 VEGETATIVE RESPONSE TO CLEARCUTTING & CHOPPING IN A N FLORIDA FLATWOODS FOREST JOURNAL OF RANGE MANAGEMENT 35(2):214-218 PAPER NO. 326	RANGE REHABILITATION	-	-	-	-	-	-
MORRIS, LARRY A. ET AL 1981 WINDROW COMPOSITION IMPAC REPORT 6(3) PAPER NO. 167	SITE PREPARATION	-	X	-	-	-	-
MORRIS, LAWRENCE A. ET AL 1983 DISPLACEMT OF NUTRIENT INTO WINDROWS DURING SITE PREPARATION OF FLATWD FOREST SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 47(1983):591-594 PAPER NO. 165	SITE PREPARATION	-	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR SLASH PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
NEARY, D. G. ET AL 1983 SITE PREPARATION AND NUTRIENT MANAGEMENT IN SOUTHERN PINE FORESTS 6TH NORTH AMERICAN FOREST SOILS CONF:121-144 PAPER NO. 13	MULTIPLE	-	X	-	-	-	-
OUTCALT, KENNETH W. 1982 MECH SITE PREP IMPROVES GROWTH GENETICALLY IMPROVED/UNIMPROVE SLASH PINE IN FL USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:11-13 PAPER NO. 172	SITE PREPARATION	-	X	-	-	-	-
PEARSON, H. A. WHITAKER, L. B. 1974 FORAGE & CATTLE RESPONSES TO DIFF GRAZING INTENSITIES ON SOUTHERN PINE RIDGE JOURNAL OF RANGE MANAGEMENT 27(6):444-446 PAPER NO. 405	GRAZING SYSTEM	X	X	-	-	-	B
PEARSON, HENRY A. 1980 FOREST AND RANGE INTERACTIONS USFS SO-34 GTR, 1ST BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:339-342 PAPER NO. 360		X	X	-	-	-	B,C,IRR
PEARSON, HENRY A. 1983 FOREST GRAZING IN THE SOUTHERN UNITED STATES OR ST UNIV, COLLEGE OF AGR SCI, SYMP SERIES 2. TIMBER PRESS, BEAVERTON:247-260 PAPER NO. 358	VEGETATIVE MGMT		X	-	-	-	B

TIMBER MODEL - CITATIONS FOR SLASH PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
PIENAAR, LEON V. ET AL 1983 RESPONSE TO CONTROL OF COMPETING VEG IN SITE-PREPARED SLASH PINE PLANTATIONS SOUTHERN JOURNAL OF APPLIED FORESTRY 7(1):38-45 PAPER NO. 164	COMPETITOR CONTROL	-	-	X	-	-	-
PRITCHETT, W. L. SMITH, W. H. 1973 FOREST FERTILIZATION IN THE U.S. SOUTHEAST 4TH NORTH AMERICAN FOREST SOILS CONF PROC:467-476 PAPER NO. 27	FERTILIZATION	-	X	-	-	-	-
PRITCHETT, W. L. COMERFORD, N. B. 1982 LONG-TERM RESPONSE PHOSPHORUS FERTILIZATION ON SELECTED SE COASTAL PLAIN SOILS SOIL SCIENCE SOCIETY OF AMERICA JOURNAL 46(1982):640-643 PAPER NO. 158	FERTILIZATION	-	-	-	-	-	-
SARIGUMBA, T. I. ANDERSON, G. A. UNKWN RESPONSE OF SLASH PINE TO DIFFERENT SPACINGS AND SITE-PREPARATION TREATMENTS SOUTHERN JOURNAL OF APPLIED FORESTRY:91-94 PAPER NO. 162	SITE PREPARATION	X	-	-	X	-	-
SARIGUMBA, TERRY I. 1984 SUSTAINED RESPONSE OF PLANTED SLASH PINE TO SPACING AND SITE PREPARATION USFS SO-54 GTR, 3RD BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:79-84 PAPER NO. 177	SITE PREPARATION	X	-	-	-	-	-

TIMBER MODEL - CITATIONS FOR SLASH PINE

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
SARIGUMBA, TERRY I. UNKWN FERTILIZATION OF YOUNG PLANTATIONS IN THE SOUTHEAST COPIES AVAILABLE UPON REQUEST PAPER NO. 169	FERTILIZATION	-	X	X	-	-	-
SAUCIER, JOSEPH R. ET AL 1981 GREEN WEIGHT, VOLUME, BOARD-FOOT AND CORD TABLES FOR MAJOR SOUTHERN PINES SPP GEORGIA FORESTRY COMMISSION, GEORGIA FOREST RESEARCH PAPER 19 PAPER NO. 235		-	-	-	-	X	-
SCHUMACHER, F. X. COILE, T. S. 1960 GROWTH AND YIELDS OF NATURAL STANDS OF THE SOUTHERN PINES PUBLISHED BY T. S. COILE, INC., DURHAM, N.C. PAPER NO. 283		X	-	-	-	X	-
SHOULDERS, EUGENE TERRY, T. A. 1978 DEALING WITH SITE DISTURBANCES FROM HARVESTING & SITE PREP IN LOW COAST PLAIN SYMPOSIUM ON PRINCIPLES OF MAINT PRODUCTIVITY ON PREP SITE PROC, MS STATE UNIV PAPER NO. 269	MULTIPLE	-	-	-	-	-	-
STEWART, RONALD (COMPILER ET AL 1984 EFFECTS OF COMPETING VEGETATION ON FOREST TREES: A BIBLIOGRAPHY WITH ABSTRACTS USFS WO-43 GENERAL TECHNICAL REPORT PAPER NO. 300	COMPETITOR CONTROL	X	X	X	X	X	B,C

CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
SWINDEL, BENEE F. ET AL 1983 MULTI-RESOURCE EFFECTS OF HARVEST, SITE PREPARATION & PLANTING IN PINE FLATWDS SOUTHERN JOURNAL OF APPLIED FORESTRY 7(1):6-15 PAPER NO. 355	VEGETATIVE MGMT	-	-	-	-	-	-
SWITZER, G. L. ET AL 1978 CLEARCUTTING VS ALTERNATIVE TIMBER HARVESTING - STAND REGENERATION SYSTEMS 5TH NORTH AMERICAN FOREST SOILS CONF PROC:477-515 PAPER NO. 287	MULTIPLE	-	-	-	-	-	-
THILL, RONALD E. WOLTERS, GALE L. 1979 CATTLE PRODUCTION ON A SOUTHERN PINE-HARDWOOD FOREST RANGELANDS 1(2):60-61 PAPER NO. 359	VEGETATIVE MGMT	-	-	-	-	-	B,C
TIARKS, ALLAN E. 1982 EFFECT OF SITE PREP AND FERTILIZATION ON SLASH PINE GROWING ON GOOD SITE USFS SE-24 GTR, 2ND BIENNIAL SOUTHERN SILVICULTURAL RESEARCH CONF PROC:34-39 PAPER NO. 174	MULTIPLE	-	X	-	-	-	-
TIPPIN, TOM (EDITOR) 1978 PROCEEDINGS: SYMPOSIUM ON PRINCIPLES OF MAINT PRODUCTIVITY ON PREPARED SITES USFS SE AREA STATE & PRIVATE FORESTRY, ATLANTA, GEORGIA PAPER NO. 234	MULTIPLE	-	-	-	-	X	B,C

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CITATION	PRACTICE	STOCKING LEVEL	SEED SAP GROWTH	POLE & SAW	GROWTH CURVES	G AND Y TABLES	ECONOMICS
WALKER, LAURENCE C. PERKINS, HENRY F. 1958 FOREST SOILS AND SILVICULTURE IN GEORGIA SCHOOL OF FORESTRY & COLLEGE OF AGRIC, UNIV OF GEORGIA-ATHENS, REPORT 4 PAPER NO. 233	MULTIPLE	-	-	-	X	-	-
WILHITE, L. P. JONES, E. P., JR. UNKWN BEDDING EFFECTS IN MATURING SLASH PINE STANDS SOUTHERN JOURNAL OF APPLIED FORESTRY:24-27 PAPER NO. 163	SITE PREPARATION	X	X	-	X	-	-
WILLISTON, HAMLIN L. 1977 RELEASE CUTTING IN SOUTHERN FORESTS: ECONOMICAL AND EFFECTIVE STAND CONVERSION USFS FOREST MGMT BULLETIN (NOV 1977) PAPER NO. 104	COMPETITOR CONTROL	-	X	-	-	-	-
WILLISTON, HAMLIN L. 1978 GROWTH OF UNDERSTOCKED SOUTHERN PINE STANDS USFS FOREST MANAGEMENT BULLETIN, SE AREA (FEBRUARY) PAPER NO. 11	COMPETITOR CONTROL	X	-	-	-	X	-
WOLTERS, GALE L. 1973 SOUTHERN PINE OVERSTORIES INFLUENCE HERBAGE QUALITY JOURNAL OF RANGE MANAGEMENT 26(6):423-426 PAPER NO. 364	VEGETATIVE MGMT	-	-	X	-	-	-

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